VOL. XXVI NEW YORK—THURSDAY, JANUARY 11, 1912—CHICAGO No. 2

THE AUTOMOBILE

Opening of Garden Show

Brilliant Start of 12th Annual Exhibition

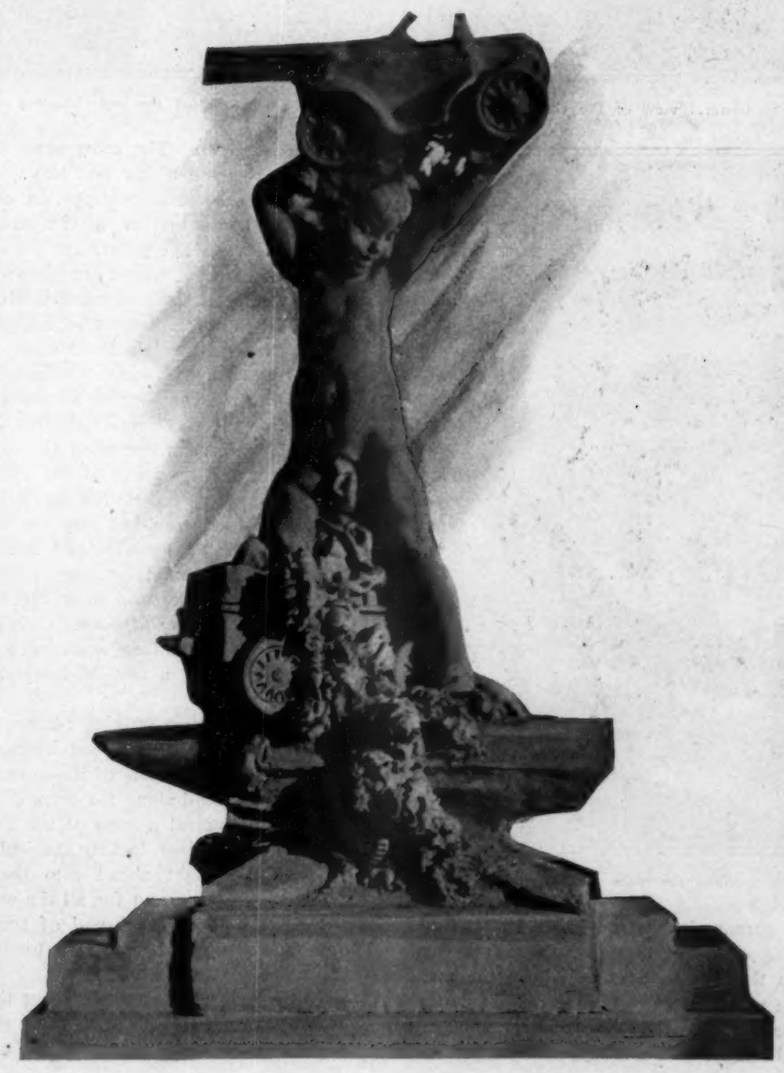
DECKED like a Queen, Madison Square Garden opened its doors Saturday night for the commencement of the final automobile show ever to be held within its vast arena. Outside, the northwest wind bayed like a lost hound and the mercury sank close to the little bulb, but the blizzard weather failed to cool the ardor of the motor-loving public and on the instant of opening the crowd poured in, making a living current through the lobby that extended from wall to wall.

At 8 o'clock the main floor was fairly filled and in another hour the whole building appeared to be holding its capacity. The official count shows that the figures of last year were not quite reached, but it seemed as if the building could contain few more.

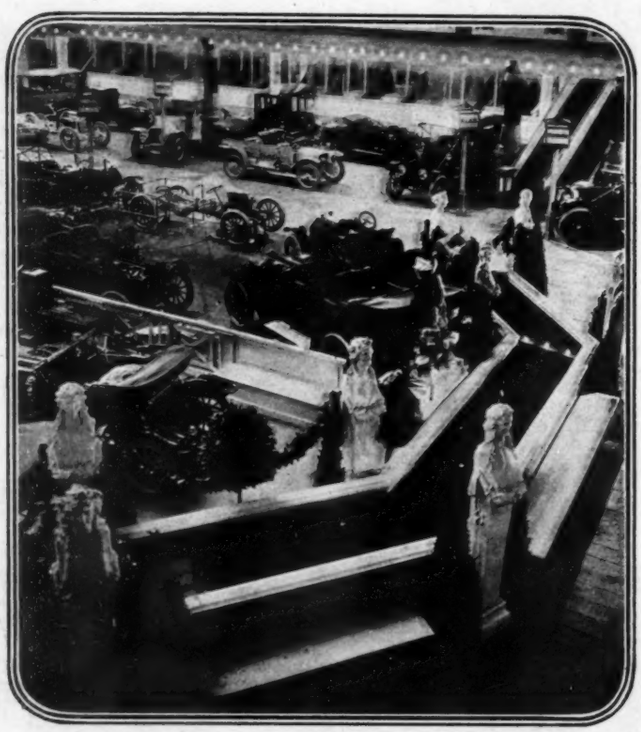
The first impression made by the vast aggregation of automobiles and their accessories in the setting prepared for the exhibition was businesslike, but as the details were more carefully observed, their artistic perfection grew in importance. The Egyptian color scheme, embodying the shades and gradations of color found in the desert, ranging from a palpable crimson in the friezes and the brilliant greens of the oasis, to the drab and yellow of the Sahara sands, served well to frame the latest products of motordom and to bring out by contrast the perfection and grace of their lines.

The space plans are similar to those used for several years past and the companies with the largest production as well as seniority in the organization again had the choice of space.

They are ranged on the main floor, the cen-



General view of the Garden Show, looking toward the east end of the huge building



Artistic fountain opposite the main entrance

tral portion of which is surrounded by a wide aisle. Outside the aisle, and around the walls are many of the best-known makes of automobiles in the United States. Above the main floor, situated on a wide platform balcony, are more splendid examples of the progress of automobile development, while in Exhibition Hall, off to the right of the lobby, another fine collection is shown. The show space devoted to the display of completed cars is a few feet less than it was last year. The decorative scheme of this portion of the show is simple but effective, consisting of a vineyard scene contrasted with autumn leaves. The pillars are twined with ripe grapes.

The accessories, which are shown in 322 stands located in the basement; on the elevated platform; in the galleries and in the space corresponding to Exhibition Hall on the second floor. Never before in the history of the industry has such an aggregation of accessories been shown. Everything that enters into the composition of the automobile is displayed in exhaustive variety. Everything that goes to make up the sum total of comfort in operating the car is on display. The arrangement and grouping of the various kinds of accessories might be improved from the viewpoint of the seeker for comparative information, but they are all there.

Besides the automobiles and automobile accessories, there are a score of stands in one of the balconies in which the leading motorcycles and their accessories are shown.

All told there are fifty-nine makes of cars on display, thus the total of exhibitors amounts to 401, a record-breaking number, marking a new high-water mark in the vogue of the automobile.

Perhaps the most striking feature of the decorative scheme in the main hall is the giant likeness of the Oriental image depicting the apotheosis of the automobile. This great mural painting is spread along the great diameter of the lofty dome. It shows a tropical woman of the East, dressed in the habiliments of the Orient, lacking the veil. Her dark, far-visioned eyes gaze straight ahead into the future. A half smile brightens the face, and for all the world as if she were about to offer sacrifice to the god of transportation, she holds in one hand a miniature of the automobile of 1912 while in the other she supports a truck.

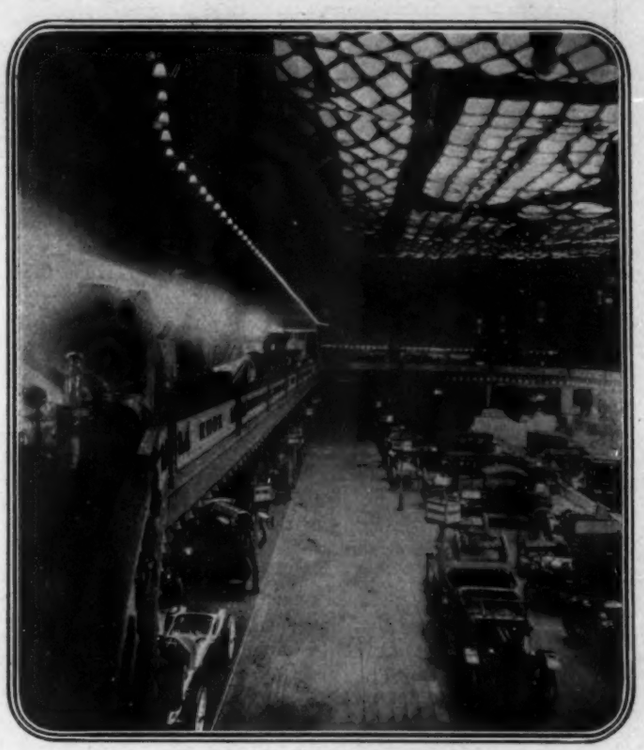
There is an assured touch about the designing, artistic conception and execution of this work that accords precisely with the marvelous development of the automobile.

On the main floor the exhibits are not too crowded, but in the galleries space is at a premium

The New York show has never been primarily a local selling show. Of course, there is always more or less selling and the total in recent years has been an important item in the industry. But it does present the grandest opportunity of the year to the industry itself. Practically every organization represented in the building has present at least one of its executive officers. Some of the companies have their whole staffs. At any rate it is undoubtedly true that there are more prominent men of the industry in New York at present than ever before in the history of the city. These men are not here to sell a few cars or a few accessories or to establish a few scattering agencies. They have come to the show to see the product of the other fellow; to make comparisons; to note the effect on the public of innovations installed by themselves or business rivals and also to attend the trade meetings scheduled for show season.

This year there are more meetings of size and importance on the show season program than ever before. Practically every company will hold some sort of a conference during the period. Every major organization of motordom will meet socially or for business and consequently the leaders of the industry have been attracted in swarms.

Following the idea that was suggested in 1910 and partially developed last year, the show committee of 1912 has gone into the enterprise of bringing the allies of the trade, the dealers, into close contact with the exhibition. While it may be true that the local sales are not of major importance and that the day for appointing agents and establishing agencies at the show has passed as a main factor, there is no gainsaying the fact that it is of prime importance to the dealers throughout the territory tributary to the metropolis. Most of them, it is true, have received their demonstrators and have placed their orders for stock before the opening of the show, but it is also true that there are many new ideas embodied in the models shown at the annual exhibition that are not apparent in the original lines adopted for the new year. With the passage of each season this tendency increases, particularly as the makers get away from the idea of annual models in a restricted sense.



Looking along the north balcony from the west end

Except in contest work there is no more logic in calling a car a 1912 model, than there would be in so describing a piano, sewing machine or baby carriage and each year is

Looking toward the main entrance from the northeastern corner of the balcony

finding more and more makers who coincide in that view.

Thus, there may be considerable difference in detail between the first idea of a certain yearly model and the types shown at Madison Square Garden. Quite aside from the fact that it is wise for the progressive member of any craft or industry to keep in periodic touch with the leaders of the industry, it is advantageous for the automobile dealer to take a comprehensive view of the whole trade as shown. It helps him in his work of distribution to associate with the officers of the company which manufactures his wares.

The Show Committee this year has invited over 7,000 automobile dealers to visit the show as its guests and even before the week is half over, the presence of the visitors has been quite apparent. This bringing of the makers and distributors together has worked out admirably in cases where differences have arisen that threatened to produce friction. It has been found that a word and an explanation, face to face, will often solve a difficulty that seems to be serious.

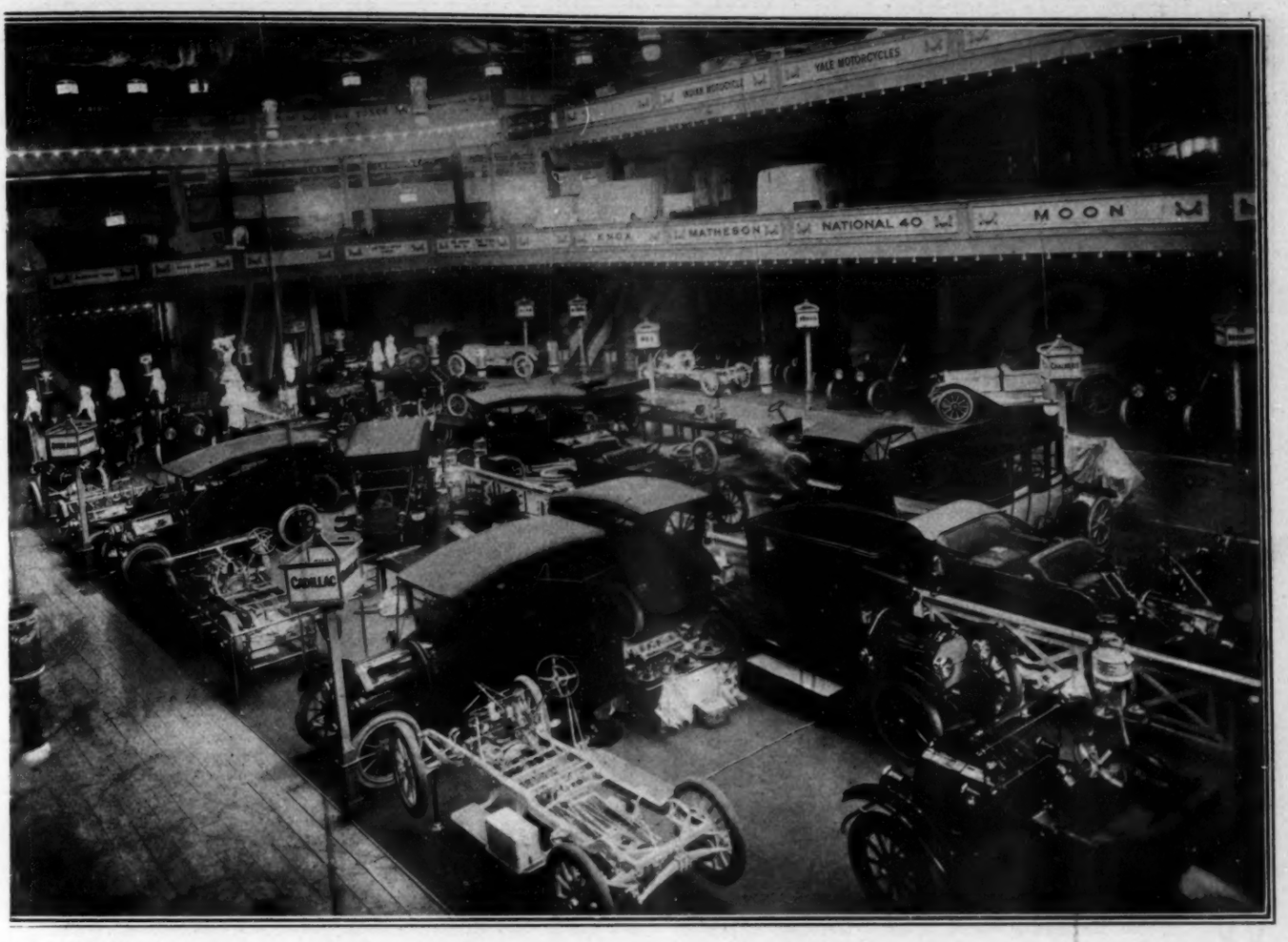
It is a magnificent show. It presents the most advanced examples of the automobile art. It groups in one vast exhibit the consummation of 20 years of unexampled progress. The character of this progress is shown with much clarity in the quality and quantity of the attendance.

It would seem strange indeed if there were no purpose behind the painstaking effort to make the annual automobile show a spectacle. It is a spectacle of impressive significance and as such it attracts tens of thousands who are not automobile owners and who are not even to be ranked as potential purchasers, at least in the present. On opening night the show is always thronged with persons whose interest in the car is measured by the shadowy hope that some day they may own one. It is astounding what a degree of motor wisdom is possessed by the average visitor of 1912. Even the small-salaried clerk whose aspirations do not rise further than one of the low-priced cars knows generally the features of all the standard types and while his personal interest may be greater in the reduction of price in some small car, he knows much about the radical changes in construction of the most costly automobiles in the show.

The women are not swayed in 1912 by the color of bodies and their shape. They appreciate those elements of design but in making selections they want to be assured of mechanical as well as exterior perfection. On the general average the visitor this year is wiser, keener and more intelligently interested in the automobile than ever before. The gradual decline of local buying at the show indicates that he has lost something of the impatient ardor to buy any old car, so long as it is a car, that marked him a few years ago as fair prey for the sellers. The same thing might be stated on behalf of the sellers themselves. They no longer seek to press their cars to market in just that way.

As the industry has developed from the buyer's point of view, so it has from the seller's. There is more dignity on both sides and more value on both sides as befits an industry of world importance.

Such shows as this are advertising displays in the broadest sense of the term. They present in compact form the standard lines of automobiles and accessories as they have been changed or crystallized by the experience gained in a year. Some of the things promised at the shows of 1911 have



The Garden as it appears from the southeast section of the balcony

failed of development and are missing in the present show, but the trends of the industry toward more comfort, more reliability and more value for the dollar are very distinct.

In the mechanical side of the proposition the refinements have been numerous as appears in other sections of this issue of THE AUTOMOBILE. In body building and body arrangement there have been noticeable changes as exemplified in the show cars, but the principal difference between the automobile of 1912 as shown at Madison Square Garden and the standard car of 1911, lies not so much in revolutionary changes in chassis and body nor in lower prices as it does in the amount of value that is given for the dollar.

Where in former years the list price of a car represented the price that the buyer was obliged to pay for the precise items enumerated and described in the catalogs and price-lists of the selling concerns, today, in a majority of cases, it includes a varied assortment of equipment ranging in value from $100 to $250 per car.

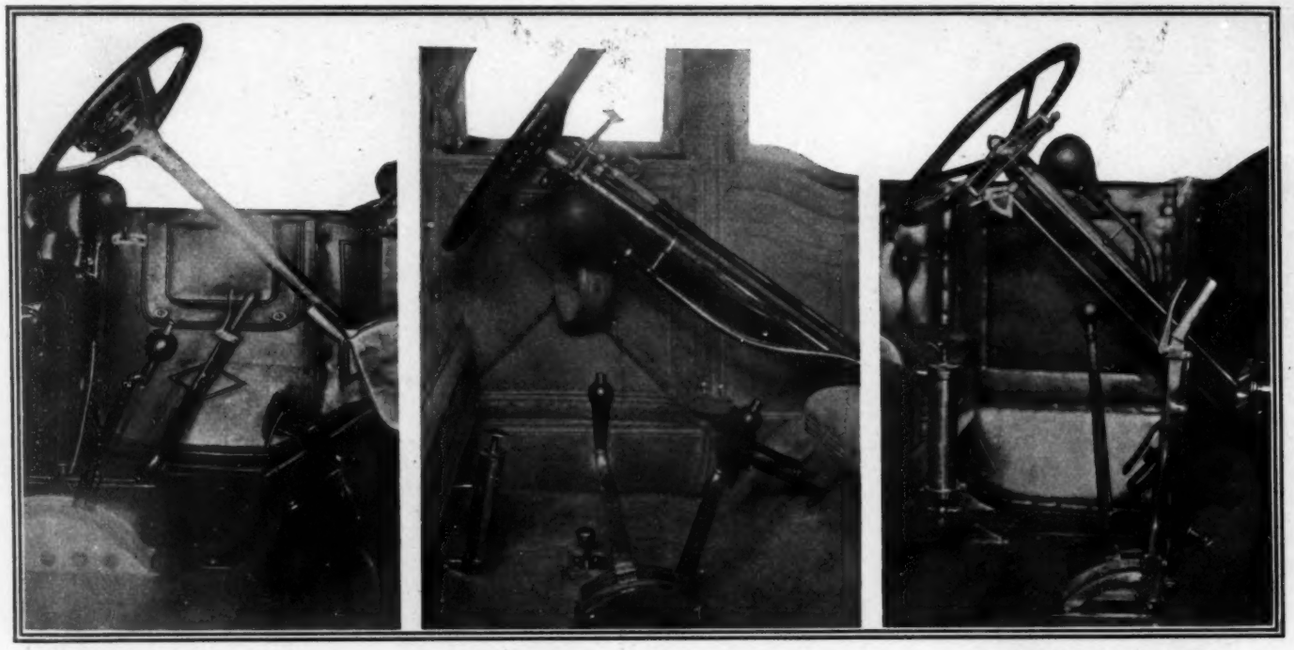
But the buyer has the satisfaction of knowing that the industry is on a strict basis of business. There is no chance for him to be much out of the way, as far as value is concerned, in buying almost any standard automobile of 1912. His dollar has a far more stable value than ever before, because he can get practically the same amount of automobile in exchange for it, no matter what price he pays. For this reason, real salesmanship and real discrimination as far as individual requirements are concerned have assumed vastly more importance than ever before.

The present development of the show is evolutionary. It has passed through the stage represented by the fad and the game and is now firmly established as a distinct advertising phase of a great industry; a great gathering of the products and producers of the leading element in the march of transportation toward the ultimate goal of civilization.

Distance and time constitute the most serious limitations of humanity, and the automobile of 1912 marks another forward step toward their amelioration. Ten years ago the makers thought they were approaching the ultimate type of the motor car, but today, looking back across the decade, they realize that the end is not yet despite all the wonderfully radical changes that have taken place under their eyes and recorded at the annual exhibitions that have been held in this great building.

And so, under the inscrutable smile of the Oriental giantess, Madison Square Garden is passing along into history. It has served a lordly purpose. It has made possible many things that otherwise would have been left undone. The great arena has been truly the cradle of the American industry. In its capacious bosom the infant was nursed and grew sturdy. Amid its glories it developed in strength, grace and beauty until today it has outgrown the cradle and stands on the threshhold of a new era, filled with the power of the world and ready to go on in the mastery of distance and the obliteration of time on its mission in the service of man.

There will be other automobile shows at which many further developments of the car will be exhibited, but when the season of 1912 ends with the completion of the Twelfth Annual Automobile Show, the Garden will be no more and to those who have any sentiment in their composition the passing of the historic pile has a deep significance.



White six center speed control | Oldsmobile coupé center control | Stoddard-Knight's left-hand wheel

Review of the Garden Exhibition

What the Future Promises As Demonstrated

WHAT will be the eventual valve?

That there is going to be some disturbance in the present valve régime is one of the manifest conditions noted at the present three-ring show now at its height Considering the Madison Square Garden and Importers Show, there are nine different car makers exhibiting one type or another of non-poppet valve, and they are all manufacturing cars for sale with these valves. There are no fewer than six foreign cars on exhibition at the Salon with non-poppet types, and at Madison Square Garden are three other makers. To these can be added the names of three companies exhibiting motors with different types of non-poppets, none of which are, however, being marketed in cars at the present time.

Non-Poppet Valves in Favor

Wherever three or four manufacturers are getting together the subject generally turns to non-poppet considerations: Some are frank to admit that there is a strong public feeling for something new. Scarcely a car owner but one time or another has had experience with loss of tension in exhaust-valve springs and undue carbonizing of the valves. They know this condition has led to loss of power due to reduced compression and disturbance of the general balance of the motor. These same owners feel that if the non-poppet valve will remedy any of these conditions then it is worth trying.

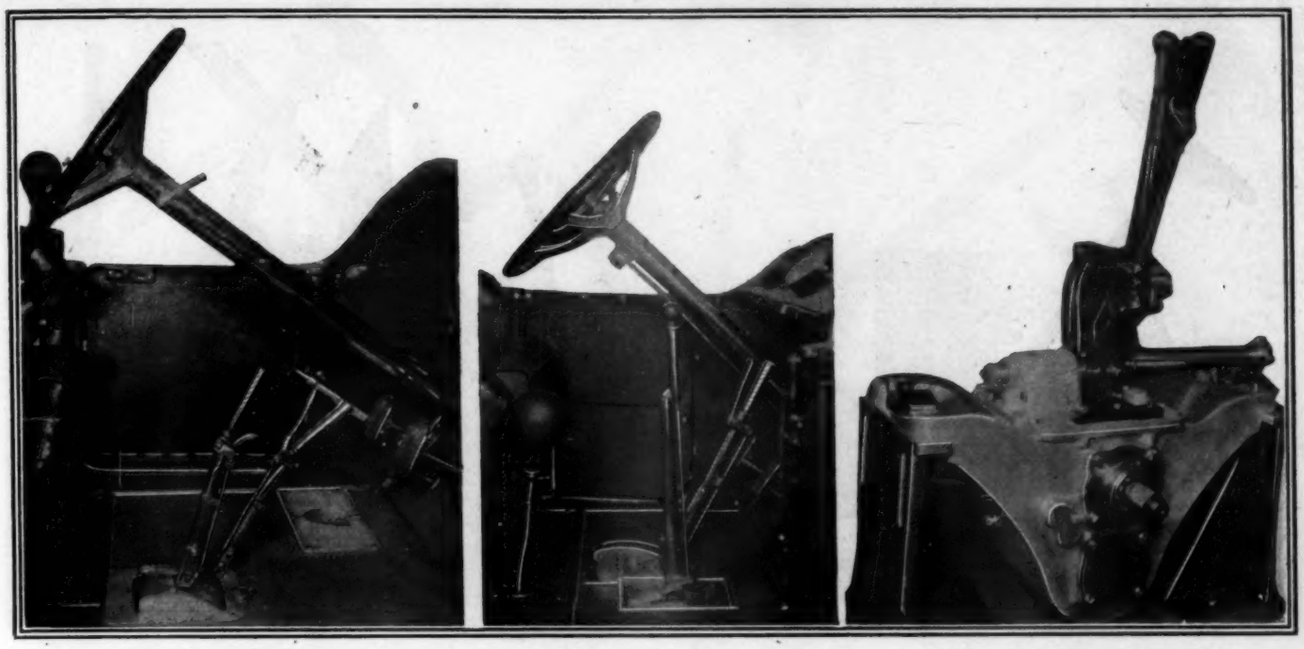
It is surprising how little of the stone wall type of argument is heard against the non-poppet types. In 1904, when Elwood Haynes tried out successfully his rotary type of valve, everybody was unanimous in saying that it would not work. To-day this sentiment is changed. The successful operation of the Knight sleeve-valve in four big makes of European cars has largely dispelled this argument. Now the trend of criticism has changed. Once the argument was that you could not lubricate a sleeve-valve or a cylinder type either. This argument has been dropped. Next was launched the argument that certain types could not be used unless monobloc motors were employed. Now that there are almost seventy different models of monobloc motors it has been satisfactorily demonstrated that this is a feasible type of motor for America, and that argument will probably be cast aside.

There are at present two big arguments being used against the non-poppet motor: The first is the cost of manufacture; the second that some of the types get noisy at high speeds. It is a fairly well established fact that in the majority of cases where these arguments are used the real cost of manufacture is not known in the slightest. It is a fact that in attempting to make any new mechanical device the manufacturing cost at the start is often double what it becomes after a year or more of manufacturing. This is true of many of the parts of the automobile. Throughout the different factories special machines have been designed and manufactured to produce certain operations, such as milling different faces on castings simultaneously, etc. So it will prove with the different parts of non-poppet valve motors. Special machines will be built for the special parts and their cost of manufacture cut in two.

Progress Is Gradual

Charles E. Duryea, who is an American pioneer in the sleeve-valve experimental field, holds the view that the eventual motor will be the two-cycle type, but that the different types of sleeve, piston, disk, barrel, etc., valves that are being exploited and manufactured today are necessary to lead public sentiment to the two-cycle situation. In a word, he holds the view that a certain series of educational processes is necessary and that the different non-poppets are today playing a most valuable part in the evolution of the gasoline motor.

Elwood Haynes, who produced his rotary valve engine and operated it in his factory eight years ago, is at present investigat-



Left wheel and center control of National | Knox left wheel and central levers | Center controlled Brown-Lipe gearset

From a Technical Point of View

in the Trend of the Principal Changes Shown

ing and developing this type of valve. Regarding ease of manufacturing a motor with non-poppet valves, he found by actual count that in the poppet-valve engine of that day sixty-eight separate pieces were necessary for the valve system as compared with eleven in the non-poppet or rotary design used, meaning a saving of fifty-seven parts per motor. This condition in 1904 would surely point to a still greater simplification of parts in 1912.

Knight Type Leads

There are five leading types of non-poppet valve motors at present in existence, these being the sleeve type, such as the Knight, Argyll, C. L. C., etc.; the ring type, the exponents being Reno and C. I. D.; the disk type as used on the Reynolds; the rotary cylinder of valve design such as used on the Mead, Darracq and Itala; and the piston type, as employed on the Hewitt and English type. With all of these the big argument advanced is quieter operation and higher efficiency. The higher efficiency argument is based on the fact that with these different valve types it is possible to have a longer valve opening and consequently obtain a better charge and accomplish a more complete exhaust.

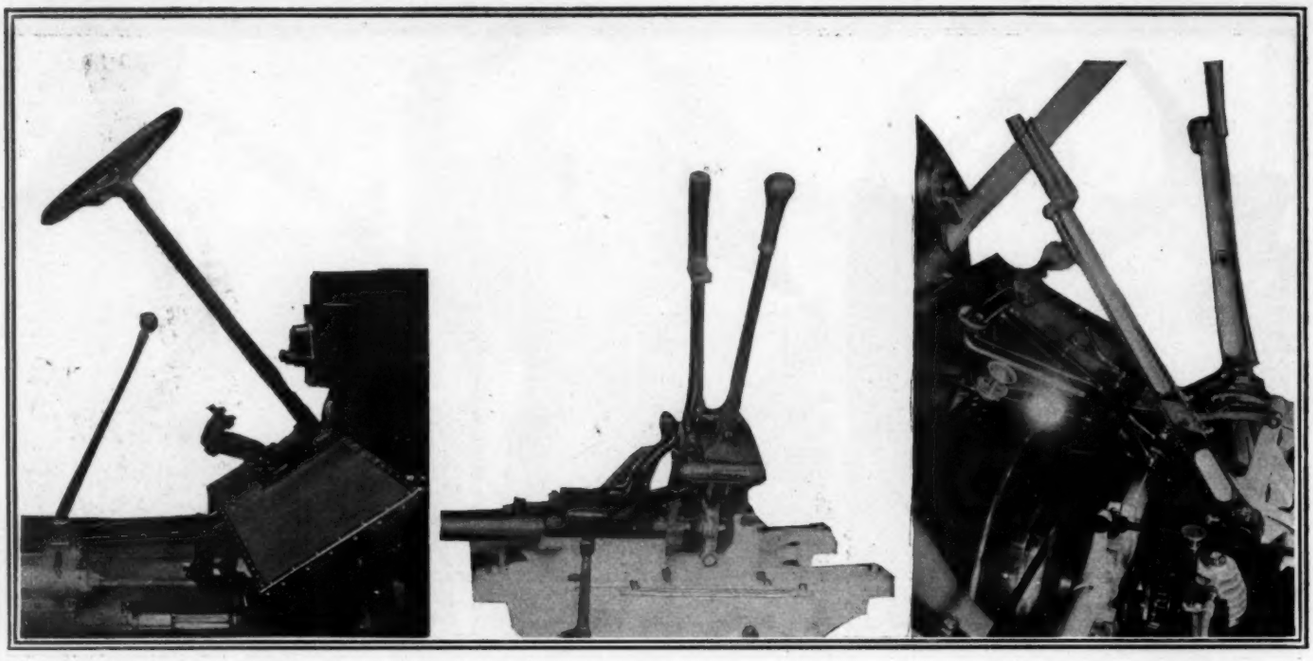
To date the Knight leads the field, having four major licensees in Europe, namely, Mercedes, Panhard, Daimler and Minerva; and to these could be added three or four names of smaller makers who purchase their motors from some one of these four. In America the Stoddard-Dayton, Stearns and Columbia have been manufacturing this type of motor; the Atlas Company, of Springfield, Mass., has recently taken it up, and the Atlas Engine Company, of Indianapolis, a different concern from that at Springfield, has the American rights for building this motor for sale in this country.

In looking through the show at Madison Square Garden perhaps the next topic that comes closest to the valve situation is that of self-starters. There has been a veritable landslide of these devices. Early last fall when one or two concerns announced that they were going to fit them as stock equipment it caused nothing short of a stampede on the part of rival makers. They were forced to fit them. They had to delay announcement of their 1912 models until they had selected a satisfactory type and were in a position to fit it. The public had been long waiting for something of this nature and naturally it became a primary consideration in purchasing certain makes of cars that a self-starter would be a part of it. The landslide which happened was not the best thing for the self-starter. It entirely swamped the manufacturer. In the course of a few weeks orders for self-starters jumped from two or three a day to as many hundred per day. In their haste many of the car manufacturers did not satisfactorily solve the self-starter problem with respect to their cars. Some are today entirely satisfied with their equipment, and several others are simply using it because the public has compelled them to and not because they have unfailing confidence in the type of starter they have fitted.

The public, however, will be satisfied with self-starters, even if some of them do not average seven starts out of every ten trials. Everybody admits that they generally work satisfactorily, and that they are an amazing help when starting cold cars in the morning. In a word, the general feeling is that the self-starter is as good in this early stage of its history as many of the other car devices now considerd standard were at the same period in their history. It would be most unnatural to develop a perfect starter in a few months.

Medium-Priced Cars Use Starters

At present the self-starter field lies largely with the medium-priced car builder. This department of the industry is the real hotbed of competition. Few of the high-priced builders have installed them, although it must be said that the pioneers in self-



Reo has center control | Standard-designed gearset for central levers | Matheson has left-hand levers

starters were the Winton people, who continue to use their original type in improved form. The self-starter problem did not appeal so strongly to the buyer of high-priced cars as to the buyers in the medium-priced field. So many high-priced cars are driven by professional chauffeurs that the starter factor does not appeal strongly to them. At least, it is not considered so necessary as for the man who drives his own machine.

At present the major attention is towards the explosive-gas type. The compressed air, electric and other purely mechanical types are all receiving their share of attention.

A close third in the interest row at the show is the unexpected activity in left-hand steering columns, and the emergency brake and change-speed levers placed in the center of the body. All of the manufacturers have taken up this problem. Its introduction is more a matter of necessity being the mother of invention. The fore-door body is imperative this year. Everybody demands it and every maker has to provide it. The fore-door cramped the lever situation. Those who placed the two levers inside the door at the right found that there was little room for satisfactory movement of them. Those who placed these levers outside of the body discovered that the general appearance of the car was more or less impaired. The problem then remained as to the most satisfactory solution. The levers could be placed in the center but that necessitated left-hand working of them. Many buyers declared they could never get accustomed to this. They decided to be obstinate. The maker had to meet the situation. The shortest course remaining was to put the steering wheel on the left and place the levers in the center. This left the driving situation in its original form so far as holding the steering wheel with the left hand and working the levers with the right was concerned. This has been done and everyone seems pleased.

Central Control Has Good Features

One of the attractive features of center control is reduction in cost of manufacture. The long chain of connections between the change-speed lever and the shifter-bars in the gearbox has been eliminated. The lever is now mounted on the gearbox; everything is incased in the gearbox cover, and the troubles of hard gear-shifting due to body-strains or frame-strains transmitted to the gear-shifting connections have been eliminated. You can go still further: The body work is a better proposition in that it is entirely freed from any connection with the gearshift or brake system. The appearance of the car is vastly improved, and it is now possible for the driver when stopping at curbs to step directly onto the sidewalk.

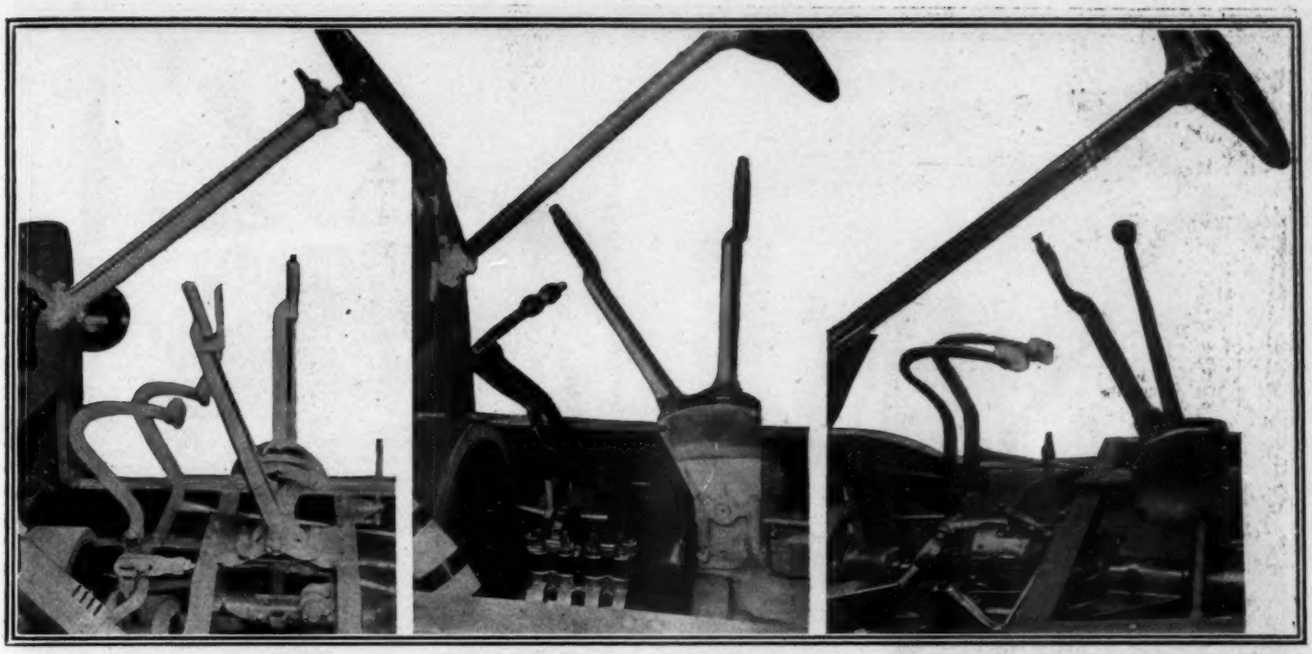
The question of body improvements will be left for a future issue. Suffice it to state here that there have been a host of little changes made which vastly enhance the comfort and also the appearance of the cars.

Many New Motors This Year

Motors have undergone a very extensive house-cleaning in the last year, thanks to the activities of the engineering departments. These activities have proceeded along two lines. First, quietness, and second, higher speed and higher efficiency, as it is often designated. To get silence more use is made of cover-plates for valve springs and tappets. These do not accomplish so much by way of housing noise as they do by way of keeping the oil in and the dust out, thereby preventing wear and also preventing a noisy engine, which is always the result of lack of oil and presence of dirt.

In obtaining higher speed and efficiency the course followed has been to lengthen the stroke and increase the valve sizes. The lengthening of the stroke is most apparent. There are over three score new motors for this year, that is, motors of different bore and stroke from last season. All of these motors have the stroke longer than the bore. The longest stroke-bore ratio is approximately 1.9 to 1 and there are three others that have ratios of 1.5 to 1 and over. The great majority have a stroke-bore ratio from 1 to 1 to 1.5 to 1. With this increase in the stroke there has been generally an increase in the valve diameter. Those who have not increased the valve diameter have increased the lift and it is becoming common practice to increase the horsepower rating simply by increasing the lift of the valve. In some cases this increase has amounted to as much as 6 horsepower. True, this increase does not show by any rating based on formulæ, but the makers claim to have produced this increase solely by improving the valve situation.

A characteristic feature of many new motors is the employment of the six-cylinder type by large builders. America now has a six-cylinder car listing at less than $2,000, and it is a certainty that when the 1913 announcements are made there will be six-cylinder cars listed at little, if any, over the $1,500 mark. There has been a very perceptible increase in six-cylinder construction with the high-priced makers. Half a dozen new com-



Center control on Mitchell Six | Levers amidships on Columbia-Knight | Overland with central control

panies have joined in this construction, among these being the Packard, White, Stoddard-Dayton, Garford, etc. Other concerns which have previously listed but one six-cylinder model have brought out two or three types, examples of these being Peerless, Franklin and Mitchell.

A most pronounced motor trend is the monobloc cylinder construction in both the four-cylinder and six-cylinder fields. There are now nearly seventy makers of monobloc motors, or at least that number of models produced. Many companies have taken up this trend of construction for the first time. They have taken it up because it is proving a cheap method of manufacture and also a satisfactory one. The old arguments of cost have been dropped. Manufacturers and owners now acknowledge that the single casting is satisfactory even under the extremes of temperature that exist in different parts of the country. One of the strongest reasons for monobloc construction is the economy of space. This is true because body suspension is receiving more attention than ever. Owners are constantly complaining about rough-riding cars on country roads. Often the cars are to blame, and quite frequently it is the fault of the roads. At any rate there is a strong feeling that much improvement can be made in the body suspension. The more the body is suspended between the axles the better. Makers of high-priced cars have realized this and there has been an average increase of nearly five inches in the length of the wheelbase on cars listing from $3,500 upwards. In nearly every case this increase has been made to give out more room and bring the body more between the axles.

Gearshifts Multiply Power

It is somewhat amusing to note how many makers still feel that they must build a car with a hood or bonnet that is impressive of strength. They are afraid to produce a short bonnet, lest the buyer will think the car has little power. This is an unsatisfactory state of affairs and one that should be rapidly corrected. The shorter the bonnet, the more room there will be for the body and the more opportunity of suspending the body between the axles. This is a good construction. All makers will be doing it in a few years. Pioneers are needed. The maker should aim at eliminating the foolish quest for needless power. He should rather aim at providing a car that gives easier riding and more rational road service than a car that is faster than all others on the road.

Keeping the horsepower down will necessitate the introduction of four-speed gearboxes. Up to the present the American maker of small cars has favored two-speed gearsets, preferring to give extra power. The flexibility of some types of motors will permit this. Experiments have shown that the pulling power of several motors does not vary perceptibly between 1,200 and 2,000 revolutions per minute. Within these speed ranges direct drive is entirely satisfactory. For speeds below such the four-speed gearbox is a desirable factor. It is needed more in the small car than in the large one. It is quite certain that America will come to it within the next two or three years.

Alco Truck Completes 100 Hours of Work

Finishing 100 hours of service in its self-appointed task of working continuously one of its 3 1-2-ton trucks, the American Locomotive Company announced at 9 o'clock Wednesday morning that the car was going along smoothly and consuming 1 gallon of gasoline for each hour of service.

The truck is working for the United States Express Company in the suburban territory of New Jersey. Actual deliveries are being performed and the stops each day average 106. The truck started on its long grind last Saturday morning at 5 o'clock and is due to finish a week from next Saturday.

Zust Assets Equal Liabilities

Schedules filed in the Federal Court by the Zust Sales Company, of New York, show assets and liabilities of about $37,000 each. The company has been in financial difficulties for several months.

On account of the large number of conflicting meetings scheduled for Tuesday, the meeting of the Contest Committee of the National Association of Automobile Manufacturers was postponed until Friday morning at association headquarters.

Gilson Resigns from Mitchell Company

James W. Gilson, formerly sales manager of the Mitchell-Lewis Motor Car Company, of Racine, Wis., has resigned and according to current report he has been engaged to head the sales department of a prominent electric automobile company, Mr. Gilson was promoted to the assistant treasurership of the Mitchell-Lewis company in May, 1911, and served as such until the opening of the present year.

Looking along the south aisle of the basement, where the accessories held forth

Garden Accessory Show

Non-Skid Tires, Electric Lighting Systems

ACCESSORY exhibitors increase in number with every successive show, and it would not be difficult to stage a complete exhibit of these necessary parts of motor cars. Staging the accessory exhibit simultaneously with the car exhibit is a fortunate situation—it gives the car man an opportunity of looking over the accessories, and also the man primarily interested in accessories an opportunity of looking over the car. It is questionable if the entire section of accessory exhibits is as crowded as at some former shows. This is due to the fact that a car is sold this year with much more standard equipment than formerly. Two and three years ago when a buyer purchased a car he bought it without speedometer, lamps, shock-absorber, windshield, top, baggage rack, tire brackets, and a score of other details. Today this is not the case. The majority of cars are now sold with a complete lamp equipment, with a windshield, with a top, with a speedometer, and with a reasonably full set of tools. This is a salutary state of affairs. It means that when the buyer has purchased a car he has not to look over the entire accessory field and spend several additional hundred dollars on what is justly considered an integral portion of the machine. In a word, the car maker has been buying the accessories in wholesale lots and putting them on his car, thus saving the individual a great deal of trouble and incidentally not a little extra expense.

In reviewing the accessory field it is impossible to more than touch upon each different phase of it in a manner more or less terse. In the magneto department there is a great increase in the number of magneto makers. Half a dozen new concerns are in place, and there is not a solitary case of an old firm having withdrawn from business. There are a couple of big concerns not exhibiting, due to undesirable exhibit spaces assigned. Magnetos are more weather-proof than formerly. They are also smaller in size in many cases and they are becoming more and more standardized. The two leading types continue, namely, the wound armature design, and also the rotor armature type, the latter being without any wire on the armature, the usual wiring being a stationary coil, within which the rotor rotates. The number of concerns using the compound armature is increasing, by compound being meant that armature with a primary and secondary winding, the primary winding with a relatively small number of turns of coarse wire with which a low voltage current is created and the secondary winding a great many turns of very fine wire in which the high-voltage induced current is generated. There are some concerns which use a single winding armature, and incorporate the secondary winding within the arch of the magnets, thereby taking a place among that class of makers properly designated as builders of high-tension instruments.

Little Advance in Two-Spark Magneto

There is not so much advancement in the use of the two-spark instrument as was expected. The two-spark instrument has a double distributer and delivers a spark simultaneously to two plugs in the same cylinder. Laboratory tests have proven this system very advantageous in T-head motors, owing to the quicker flame propagation. There is a strong increase in the use

The accessories exhibits in Concert Hall were very prettily staged.

an Exhibition in Itself

and Wire Wheels Among the Features

of the L-head cylinder, in which the two-spark type does not show to such great advantage and consequently few builders using this type of motor adopt it. There is little to be gained in using it in the valve-in-the-head motor or in any of the sleeve or rotary valve types now marketed.

The carbureter makers have been busy. They have not settled whether a single jet or a multiple jet is preferable. They are working faithfully at the job. To show the strenuous pace in this field it is but necessary to state that three or four of the leading carbureter makers have new types now being tested out with some of their biggest customers, and they have refrained from exhibiting these. Some of these are radical changes from present types, but the makers are not satisfied regarding their adaptability on different types of motors, and do not feel justified in announcing them at the present time.

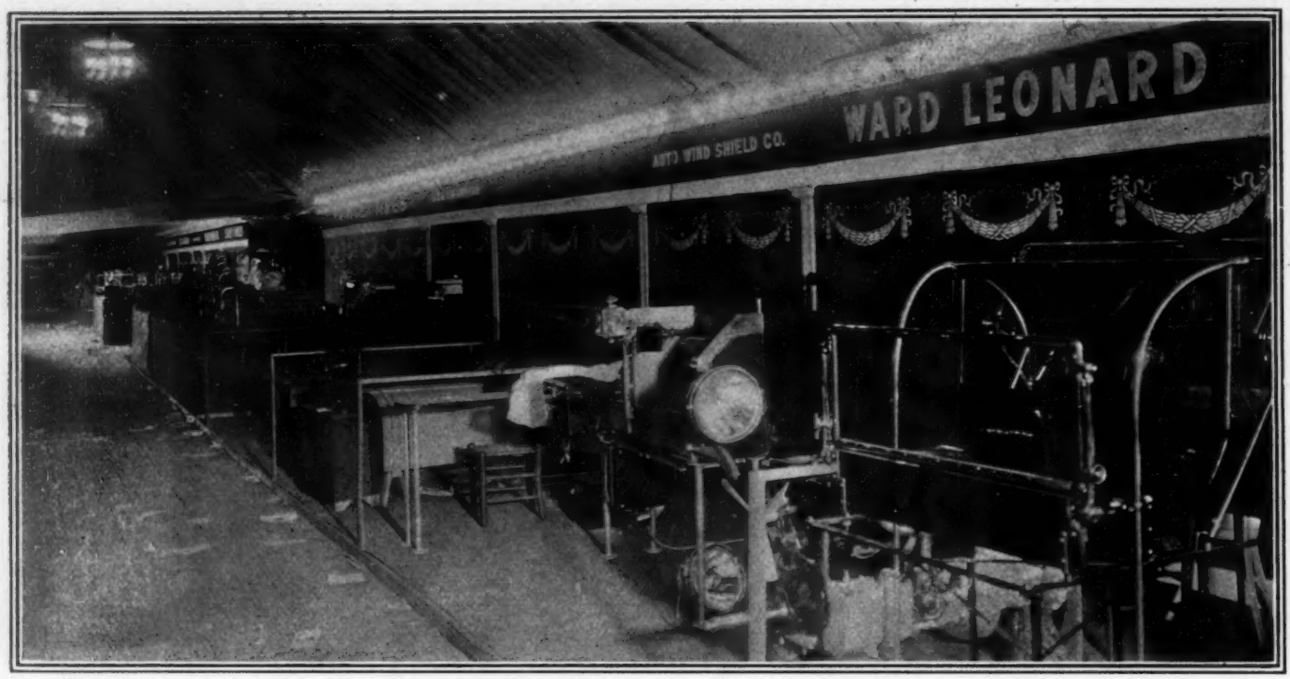
Several Changes in Carbureters

One or two builders have brought out changes. One has entirely discarded the auxiliary valve idea and has introduced a mechanical carbureter without springs or any variable factor. Another maker has altered the principle of his carbureter by making use of the auxiliary air current to aid in volatilizing the mixture. One concern has entirely discontinued the float idea. Others have substituted steel needle valves for bronze types. Some have increased the diameter of the gasoline passages to the float chamber. There has been a perceptible increase in accessibility but not so much as should have been made. There are still quite a few carbureters that call for a definite size of wrench in order to do a slight assembly work. There is no reason why bayonet locks and other simple fastenings could not be used to hold the cover on the float chamber and play other similar roles.

Speedometers invariably create much interest at the show. There has been little change in the principle of operation. The field is at present roughly divided among the magnetic, centrifugal force, hydraulic, and pneumatic types. The magnetic following has gained one adherent during the season. There has been a reduction of price in a few cases. An improvement that is commendable is reset mileage stops by which it is possible if overrunning a corner to return the reading to the route book mileage. One or two concerns have brought out new designs of flexible shafts.

The shock-absorber field has gained two or three makers during the year. The different types remain unaltered. The scissor style with friction surfaces for absorbing the shock retains its large following. There are several combination cams and spring types, all of which are characterized by possessing a neutral zone, that is, a normal position in which there is no restriction on the up or down movement of the car, the absorber coming into use only after a certain movement up or down has taken place. There are a few followers of the hydraulic and pneumatic types exhibiting. Their designs remain the same in principle as heretofore.

Windshield makers are not so close to the real accessory buyer as formerly, due to the fact that much of their business is now being done direct with the car builder,



Every inch of room in the capacious basement was utilized to accommodate the accessories exhibits

the windshield being a stock equipment. At every car exhibit where the windshield is stocked, attention is generally directed to the clear-vision or rain-vision factor of the shield. By this is meant sloping the upper half downward and to the front, forming, as it were, a canopy or veranda effect over the lower half of the shield and leaving a clear open space between the halves. This gives an ideal result for rainy weather or snowstorms. An innovation on many windshields is the incorporation in the baseboard of some form of ventilator for foredoor bodies. In some this ventilator takes the form of a rotating semi-cylindrical door. In others it is merely a hinged door which can be inclined downward and rearward, thereby directing the air against the floor boards. The automatic windshield is more than ever in evidence, and is indicative of the fact that to-day the driver does not want to have to slow up his driving pace even to put up the windshield, to drop it, or put it in any of the other desired positions.

Signal devices, or horns, appeal very strongly to the accessory buyer, owing to the fact that the electric horn is a leader and the time has not yet arrived when the majority of the makers fit it as stock equipment. The different types of electric horns, such as the motor-operated, electro-magnetic type, and turbine, are continued. There is a good display of bulb horns and exhaust whistles of various types are shown in much the same form as previous years. Several examples of combination bulb and electric types are on the market. The apparent reason for this combination is that many consider the bulb type satisfactory for city driving, but insist on the electric for country work. In the fitting of horns on car bodies there is more effort to entirely hide the flexible tube within the body as compared with the days when it appeared to be the object of the car owner to see how much brass tubing he could hang along the sides of the body.

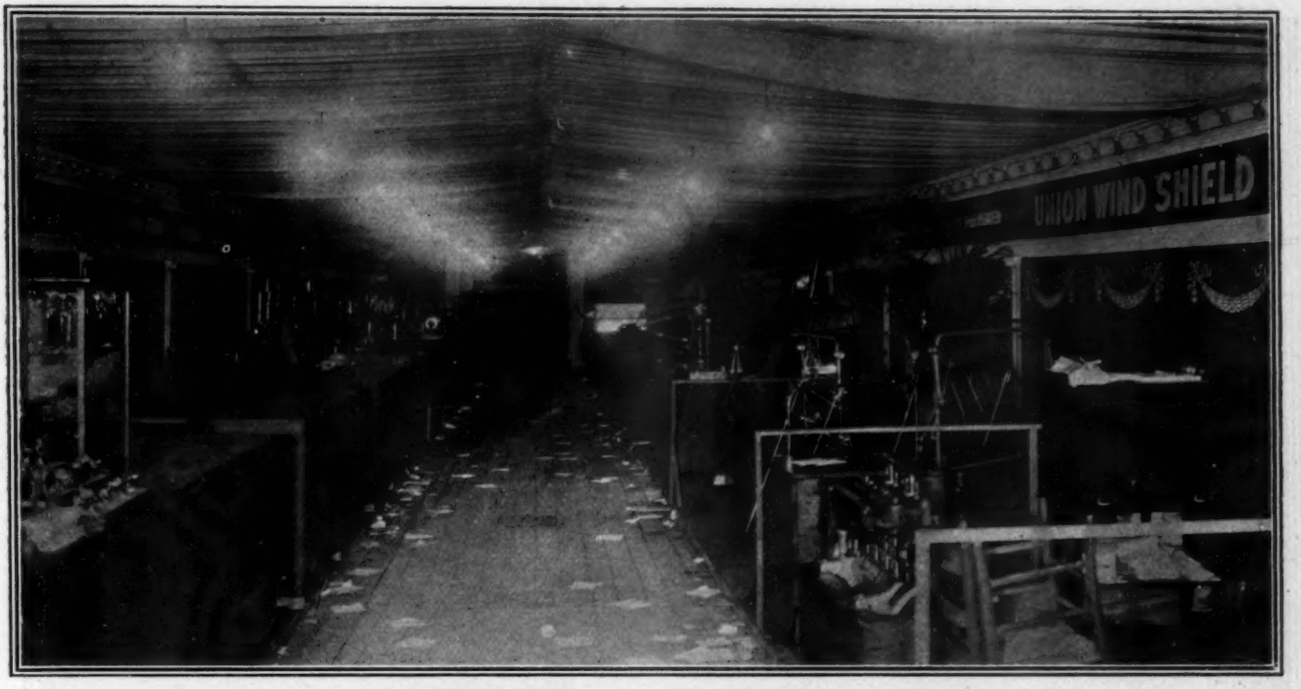
Increase in Anti-Skid Treads

In the tire department the increase in the number of anti-skid treads is noticeable. Two of the major tire companies have brought out anti-skid devices for this season. All of the old concerns building anti-skids have continued them in practically unchanged form. There is also strong demand for anti-skid chains, and not a few other devices are listed which are intended to help car operation in bad weather.

The usual list of general tire features is a large one. There are many types of brackets for carrying spare tires and demountable rims. The prevailing fashion of carrying spares on the rear of the tonneau has called for some redesigning in these brackets. A feature with many of them is an integral lock which is a good safeguard against tire thieves.

Tire vulcanizers constitute a very active department of the accessory field. Their devices are now varied for garage, repair

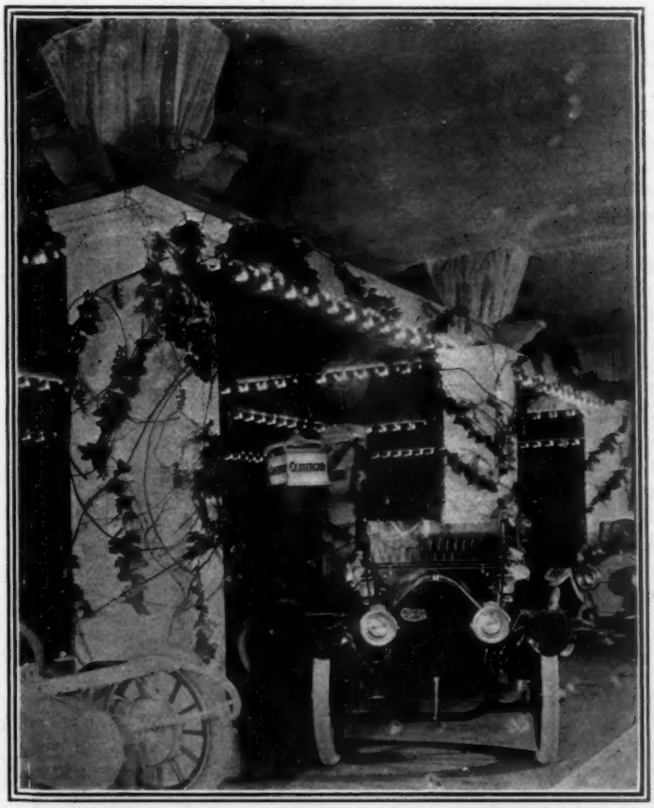
Showing the artistic arrangement of the ticket offices



The cross aisle in the basement accommodated 24 of the accessories exhibits

shop, and individual users. The individual owners' vulcanizer today is a reliable and easily operated device, having all of the necessary temperature gauges, etc., to insure scientific operation. the spirit of caring for small ruptures in the treads of tires before they become blowouts is growing with the car owner.

The more general introduction of electric lighting has led to many devices for lighting acetylene lamps. The majority of these are electric devices which furnish an ignition spark above the acetylene burner in the lamp. These devices make it possible to light the lamps from the seat. They are generally placed on the dash and incorporate a valve for the control of the gas, the valve and lighting system being inter-connected.



The decorations in the Exhibition Hall were most ornate

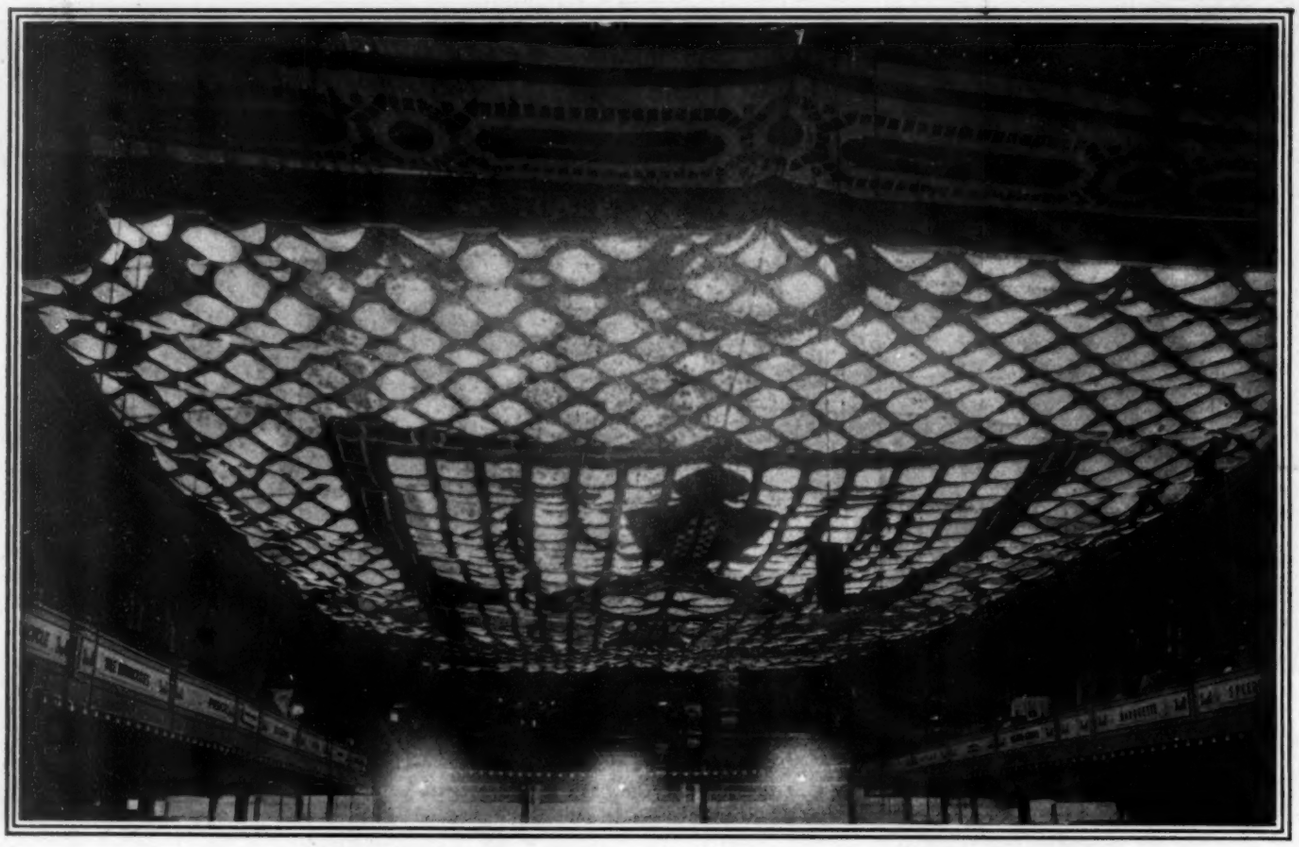
In gearsets the most notable change is the exhibition of sets for center control, these having the change speed lever and emergency-brake lever supported on them. This arrangement is very compact, and is a better manufacturing proposition than where the levers are placed at the side of the car. The simplification applies especially to the gearshift feature. This is entirely freed from any strains set up by frame warping. Only last year two or three makers experienced trouble with gear-shift mechanisms due to this trouble. Gearsets are more compact than formerly and there is a trend toward the use of annular ball bearings and short series roller bearings of different types.

Wire Wheels in Evidence

In the wheel field the most noticeable factor is the exhibition of two or three types of wire wheels. With many of the car makers there is a strong feeling that the wire wheel is coming, not a few of them having experimental wheels on demonstrating cars at the present time. The extra strength of the wire wheels and the better tire service obtained from them are the strong arguments advanced in their favor.

The use of demountable rims is increasing. These rims are now stock equipments with a great many car builders, whereas a year or so ago but few of the high-priced makers listed demountable rims as options, today these same makers sell them as standard equipment, and cars listing at under the $2,000 mark are sold with these types of rims. The rim builders are constantly endeavoring to produce a type of rim that can be sold as stock on cars listing under $1,500. With all of these rim builders the great aim is to produce a rim without any loose parts, that is a rim that can be changed without having to entirely remove a nut, or other part that might get lost easily.

The manufacture of motors by accessory people is growing. There is a stronger market for the motor today than there was three years ago. This is further accentuated by the fact that at the present time one or two foreign car representatives are touring American factories looking for motors that can be used in cars that they purpose assembling. It is a fact that the foreign market for the motor is worth developing.



The distinguishing feature of the Garden's decoration was the immense ceiling in mosaic effect

Garden Show as a Business-Bringer

AT the close of the third evening of the show at the Garden great activity was reported by most of the exhibitors, both in the automobile and accessory departments. They had found the first three days of the week full of work and hustle, but there were few among them who doubted that their efforts would not be redeemed by success, if indeed they had not already brought returns.

The largest number of deals went to the representatives of accessory manufacturers. Many automobilists, while looking over the show, bought a horn here and an outfit of spark-plugs there, and a number of small-tool and kit men closed numerous small transactions, which, however, amounted to a respectable total. Other goods, such as carbureters, magnetos, batteries or windshields were hardly sold in retail but the dealers closed many contracts with out-of-town jobbers who had come to look over the new devices and the improvements in old ones.

One fact worthy of notice was that such firms as the makers of Schebler carbureters, Bosch and Eisemann magnetos, Goodyear and Goodrich tires and the representatives of many other standard products reported hardly any new business that they had done at the show while at the same time they were unanimous as to the general prosperity reigning in the trade. They added that they did not figure on any retail orders from passers-by, nor did they expect to close new contracts right at the show, as the representatives of automobile makers there present were not the people who closed the contracts. These accessory makers were at the show merely to keep their names before the public, having demonstrated the value of their goods during the past decade or so. Practically the same holds for the makers of working units, such as motors, transmissions and rear axles, who displayed their products to the passing public and to the exhibitors who wandered about the Garden. They simply made use of this rendezvous of the industry to show their goods alongside those of their competitors and they looked at their exhibition spaces as business cards sent into the industry's offices once more.

Exhibitors of electric lighting systems such as Vesta, Gray & Davis, Rushmore, Deco and Esterline were busy explaining the virtues of their equipment to the many motorists interested in these apparatuses. Several of these firms closed quite a number of contracts with dealers from all over the East. A similar activity was to be noted at the stands of Jericho, Newtone and the Dean Electric Company, all of whom did a retail business and closed contracts with dealers as well. The Lovell-McConnell people expressed their satisfaction with the present state of the trade as well as with the outlook, although they feel that among those who go to the Garden there are few or none who see the Klaxon for the first time; but the necessity of displaying its goods is as strong for this company as is that of prominent motor-car makers showing their products in luxurious settings on the upper row.

New Products Attracted Attention

Relatively new products, as Newmastic tires, Lambert demountable rims, Mondex mufflers and several makes of windshields attracted a good deal of attention on the part of the automobile public as well as that of the makers of cars, and, while the representatives of the above-named factories hesitated to give names they were very positive in referring to large contracts already closed and to others almost closed with automobile makers in various sections of the country. A similar state of affairs exists

at the places of other dealers in the same line of goods. The Booth and Lambert people have put many of their hopes in the adaptation of their demountables for wire wheels, and, having demonstrated the practicability of this work, they are of the opinion that, before long, wire will replace second-growth hickory in automobiles.

Lubricant dealers have had a busy time ever since the show started in getting the public interested in their products after having attracted their attention by various original exhibits. But their real business has been to arrange with dealers, jobbers and supply-and-garage men who came to town for the big show. The activity of tire-accessory exhibitors was of a similar nature and some of the representatives of tire-repair outfits have the appearance of satisfaction incarnate.

Main Floor and Balcony Attracted Crowds

Of course the crowd devoted most of its attention to the automobiles on the main floor and first balcony. At no time during the evening were there many salesmen standing idle, even for short intervals. They all saw their opportunities to interest prospectives, especially on Tuesday evening, which was Society Night. The high-priced displays were crowded to a surprising extent and no small number of sales were closed that evening. In passing the Lozier stand the writer saw what looked like the final touch of a sale of a seven-passenger touring car. The Packard exhibits were sold by that evening almost without exception. The spaces where the three Knight types of motor were shown were very congested, and aside from the manifestation of curiosity and interest of many well-to-do visitors there was to be seen some activity that looked like sure-enough business. The same thing was evident at the White, Premier and Speedwell exhibits. The Pierce-Arrow force found the trade as good as it ever was at show time, with the public preferring to invest in automobiles giving its full value in pleasure undiminished by any sort of trouble, rather than to take on securities rendered insecure by the steps taken by the government against corporations of all sorts.

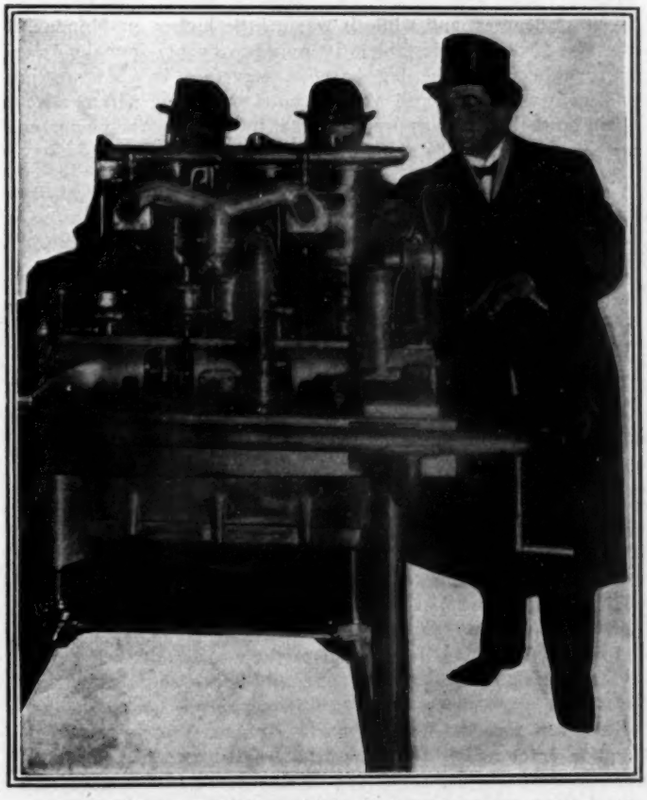
At the spaces held by the lower-priced machines salesmen were fully as enthusiastic about the business doing and done as they were at the high-priced quarters. Hudson, Reo, Oakland and Maxwell found plenty of work in satisfying the curiosity of the numerous visitors that stopped before their exhibits and demanded to have explained to them the advantages of this and that new feature.

The elaborate equipment of this year's stock cars appeals especially to the visitors, but no less appreciation is met by the improvements in mechanical and body designs. Furthermore, everyone is glad of the most distinguished air given to the whole affair by the elimination of such demonstrations as the blowing of horns. They all find that this rule is fully in keeping with the general artistic layout and arrangement of the exhibition.

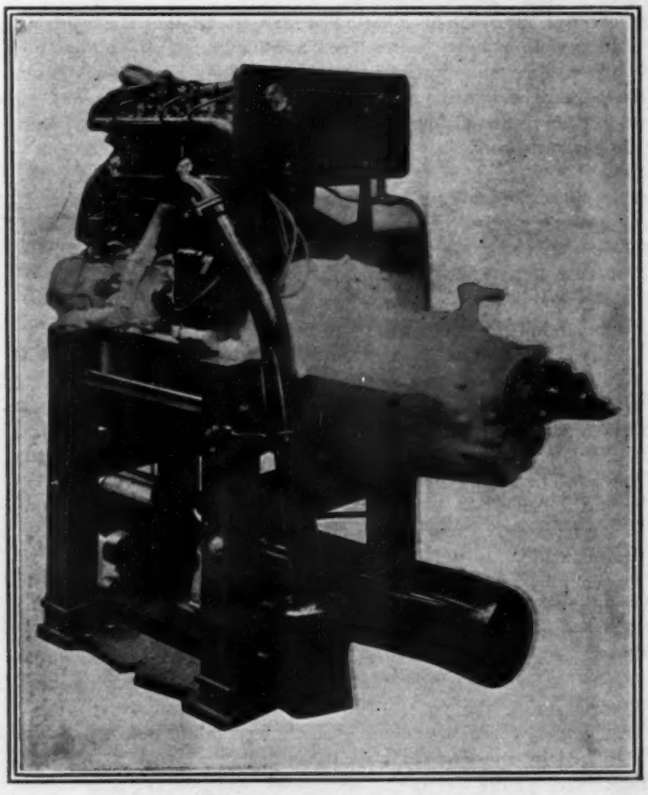
Returning once more to the accessories, it may not be very easily understood how it is possible for accessory makers to do a good business now when cars are sold with full equipment, as compared with some years ago, when one had to buy a car and practically a full separate equipment afterward. It is admitted by many makers that with this change of conditions it is not quite as easy now as it was then to sell accessories; but the manufacturers recognize that the making of a good many kinds of accessories, like carburetion, ignition, lubrication and lighting systems and sundries, as well as tools and tire sundries, requires more attention than an automobile maker can profitably devote to their manufacture, so that, if a man brings out a product of high quality along these lines, his chances of success are good. Of course, the standard of quality is higher to-day than it was several years ago, but the manufacturing facilities have likewise been improved, so that with somewhat more effort and approximately the same capital at hand the accessory business is just as profitable as it was formerly, when the quantity of salable goods was much below the present demand.

Observations on Last Garden Show

Opening day attendance at Madison Square Garden was just under 11,500, according to Colonel Pope, of the show committee. This is above the average of recent years, but below that of last year. The chief reason for the decrease lies in the fact that



Charles Y. Knight explaining Stearns-Knight motor



Mounted model of Chalmers 36, showing self-starter

New York was in the throes of a fierce blizzard at opening time.

Last year the average daily attendance was 20,000, figuring on two full sessions a day. On that basis the crowd of opening night was well above the general average of last year, as only one session could be charged against Saturday's attendance.

The space available for exhibits is precisely the same as last year, but in the division the accessories have been given a trifle more than the 1911 proportion. The difference, however, is so small that it is not worth emphasizing.

In preparing for business the show committee went to much pains this season. Entirely aside from the avalanche of invitations that were sent out by individual exhibitors, the tickets for which have been paid for by the exhibitors, the show committee on its own behalf invited over 7,000 dealers in automobiles and accessories to attend as its guests. All told, it is estimated that 100,000 tickets and invitations have been sent out.

While no definite figures were ever submitted to the public as to the detailed cost of staging the shows at Madison Square Garden, it was given out unofficially that the cost in 1911 was $45,000. As a matter of fact it was much nearer $100,000. This year, with the simpler form of decoration and other improvements and economies of installation and operation, it is thought that the bill will be considerably less than in 1911. It would surprise no one if the total was found to be not more than $50,000. Each year the expensive steel work needed for the show has been torn out and sold at its conclusion. Nothing was kept but the furniture and some of the more permanent decorative factors.

There are 600 men employed by the show committee in maintaining the building during the show. Of these about 100 are white-wings; fifteen are uniformed police; fifteen are plain clothes men and the others are divided in various departments, not forgetting the fire brigade.

The duties of the plain clothes men are interesting. They are selected for their posts because of their knowledge of known criminals, especially pickpockets. When one of that gentry walks into the hall a plain clothes exponent of the law follows him until a favorable opportunity affords, when a discreet tap on the shoulder and a significant motion with the thumb informs the erring one that his mission is known and that the valuables of the visitors must be regarded as inviolate.

Up to date only four first-rate pickpockets of national repute have had the hardihood to make the circuit of the arena, and each was faithfully tabbed by one of the omnipresent plain-clothes persons.

There is a brand new imported system of admission. During a recent visit to Europe, Samual A. Miles noted the fact that the European system of admission to any kind of a big show was more exact than our own and thereupon he arranged to introduce the system used at Olympia at Madison Square Garden. This consists of an aisle of barred ticket booths, through which the visitors have to pass to reach the turnstiles. In Europe there is a barred wicket before the cage of each ticket seller and so there was on opening night at the Garden. But in Europe, particularly in England, little paper money is used and more coin, so that in making change there is no special amount of space needed to accommodate such a wad, for instance, as would be pushed out at a ticket buyer at Madison Square Garden in return for a $10-bill, especially if the change were made in $1-bills. The wickets caused some little delay Saturday night, but they have now been removed and access to the main hall is much easier.

When the purchaser lays down his money the operator takes it and pushes a lever which releases a trigger, dropping a brass check into the cup in front of the wicket. The visitor takes the check and puts it into a strong box at the turnstile, thereby gaining admission to the lobby.

Despite the Arctic cold that has obtained at Madison Square Garden since the opening of the show, the crowds of visitors have maintained the attendance average of other years. No visitor up to Monday night, at least, had the temerity to chuck his overcoat, and as a consequence no great discomfort was suffered in that direction.

But when it comes to the sales forces there is quite a different story to tell. An automobile salesman working in a fur-lined coat with gloves and ear-muffs is not an edifying spectacle, but many of them tried it with more or less success. Aside from these prudent salesmen there were many others who worked bareheaded and barehanded and without overcoats on Saturday night. A few were absent Monday on account of colds and many more were in the throes of the sniffles.

The difficulty lay, according to official announcement, in the failure of the electric generators connected with the heating system. The temperature on Saturday night was down to about 45 degrees, and while it was a little higher on Monday, it was far from comfortable. It requires twenty-four hours to thoroughly warm the big barnlike structure in cold weather and, as it was announced Monday noon that the generators were again on the job, it was predicted that by Tuesday the pneumonia temperature would be ameliorated.

Foreign Show Satisfactory

Concluding a successful show period the Eighth Annual Importers' Salon came to a close Wednesday night at the Hotel Astor. The variety and completeness of the exhibition was never rivaled by previous Salons, seventeen different makes of foreign cars having been on exhibition. Each stand did some business and it is probable that in total volume it was not far from the top notch. The shows of the importers are diametrically different from the American shows in New York, being much more largely in the nature of a market.

A considerable number of visitors from various sections of the country attended the Salon, and more or less out-of-town buying was reported. The retail agency of the Mercedes line has been taken over by the Paul LaCroix Automobile Company. The most attractive sporting exhibit of the Salon was the presence of several of the giant racing machines that won high honors during the year. The Grand Prix winner of 1911, a Fiat, and last year's winner, a Benz, were among those shown.

Judged by the standards of the other New York shows, the attendance at the Salon has been small, but general satisfaction is expressed by all the exhibitors with the results attained.

A. A. A. Talks Good Roads

Good Roads and touring matters occupied the attention of the A. A. A. executive committee at its meeting Tuesday. Chairman George C. Diehl submitted a report on the prospects for the forthcoming Federal Aid convention to be held at Washington January 16-17.

Chairman Diehl's report showed that in more than half the states the taxable resources are less than $20,000 for each mile of highway to be maintained. This, he argued, demonstrated the necessity for governmental aid in building interstate roads. He showed by statements from several prominent congressmen that road improvements are quite as appropriate, as a field for federal aid, as rivers and harbors and vastly more important to the public at large.

Reports from New Jersey told of the efforts now being made to introduce an adequate law and thus establish friendly relations with other states.

President Staples of Connecticut reported that a 30-day exemption from registration would be granted to non-residents irrespective of whether they lived in New Jersey. The attendance was fair.

Late Trade and General News

DETROIT, MICH., Jan. 8—A net profit of 14 per cent. on the capital stock of $10,000,000 is shown by the annual report of the Packard Motor Car Company, for the fiscal year ended August 31, last, which was made public Saturday.

The general balance sheet shows resources of $16,110,756.28, of which $8,265,845.82 is credited to plant after the deduction of $572,001.17 for depreciation. The surplus is $2,984,021.81.

Some of the interesting facts concerning the Packard plant, shown in the report, are as follows: Floor space, 1,642,212 square feet, or 37.7 acres; maximum number of employees during the year, 7,575; maximum monthly pay-roll, $524,407, in August. Buildings completed since the close of the fiscal year or now in construction will increase the capacity of the foundry 50 per cent.; truck department, 200 per cent. in floor space and capacity, and service department, 50 per cent. in floor space.

The Federal Motor Company has purchased the plant, machinery and equipment of the Van Dyke Motor Car Company, which recently went into bankruptcy, and the sale has been confirmed by the court. The company pays $20,000 cash and assumes a $35,000 mortgage. It is already moving in and expects to have the factory running full blast in 10 days. This gives the Federal company a capacity of 1,000 cars per year and there is ample room for extensions.

A large party of Detroit automobile men, the majority of whom were members of the Wolverine Automobile Club, left for New York, Friday afternoon, on the club's special train, to attend the New York shows. The day previous witnessed the departure of a score of Hudson Motor Car Company representatives, headed by E. H. Broadwell, vice-president of the company.

La Croix Takes Over Mercedes Local Sale

The tendency toward centralization that is apparent in some other lines is quite palpable as regards the imported cars sold in New York. The currently announced acquisition of the metropolitan sales rights for the Mercedes line by Paul La Croix, president of the Paul La Croix Automobile Company, Inc., as an individual, is the case in point. The Mercedes import rights are held by the Daimler Import Company, of which James M. Carples is the active head. These rights will be retained by the Daimler Import Company, but the metropolitan sales rights have been conveyed to La Croix.

The present line handled by La Croix includes the Renault, English Daimler, Itala, Zedel, Clement-Bayard and Mercedes. There was a report in circulation that the Lancia would be added to the line but there appears to be no justification for such a conclusion. As it stands at present the La Croix line includes at least one-third of the makes of foreign automobiles that enjoy a comparatively large sale in the United States.

Italian Garden at Milwaukee Show

MILWAUKEE, WIS., Jan. 9—The fourth annual Milwaukee show will open at 8 o'clock Saturday evening, January 13, in the Auditorium, where more than 150 pleasure cars, gasoline and electric; fifty-five commercial vehicles or both power types, and numerous accessory exhibits are now being arranged. The innovation of opening a show on a Saturday night is to be tried and doubtless will be highly successful from a financial standpoint. The decorative scheme will be that of an Italian garden, the idea of manager Bart J. Ruddle. On January 17 the annual meeting of the Wisconsin State A. A. will be held in connection with the show. On the following day the Wisconsin State Highway Commission will hold a good roads rally and demonstration. The Wisconsin Retail Automobile Dealers' Association will meet on January 16. The show will close on Friday evening, January 19. It will be open as usual on Sunday, January 14, giving visitors from points in the state an opportunity to benefit by the display of cars and accessories.

Brief News of the Local Shows

MILWAUKEE, WIS., Jan. 9—The show idea is being adopted in many cities of Wisconsin and local dealers are getting together to hold local displays. At Racine, Wis., manufacturers and dealers intend to give an exposition in the big Lakeside Auditorium, a summer park exposition place. At Beloit, James W. Menhall, probably the largest dealer, is to give a show at which other Beloit dealers will also exhibit. Dealers at Janesville, LaCrosse, Eau Claire, Manitowoc, Sheboygan, Fond du Lac, Oshkosh, Marinette, Kenosha and other large Wisconsin cities are considering similar projects.

SIOUX CITY, IA., Jan. 9—Only one automobile show will be held in Sioux City this year, instead of two, as last year. The show this year will be held in Davidson's automobile block, February 26 to March 2. There were eleven exhibitors at the dealers' show last year, and this year it is expected that there will be at least twenty.

ATLANTA, GA., Jan. 9—With 12,000 square feet of space already paid for and $5,000 worth contracted for the financial success of the Atlanta Automobile Show, which begins January 10, is assured. The show is being run by the dealers on a co-operative basis and all the money received from the purchase of space will be expended on the exhibit. The returns from admissions and various concessions will be refunded pro rata to those who have bought space. The present indications are that there will be fifty exhibitors, eighty different makes of automobiles and nearly 150 machines in the show when it will open tomorrow.

SYRACUSE, N. Y., Jan. 9—With the annual automobile show two months away over half the exhibition space in the Armory has been let. Manager W. R. Marshall says that it looks as if the accessories exhibition would have to be placed in the Alhambra, as an auxiliary.

Georgia Club Organized

ATLANTA, GA., Jan. 5—After working for months on preliminary details the Automobile Club of Georgia is at last a reality. The organization was effected at a meeting held yesterday, at which the following officers were named: Geo. W. Hanson, president; Ed. M. Durant, vice-president; J. D. Rhodes, treasurer; Howard Geldert, secretary. The following board of directors was named: Walter P. Andrews, Inman Gray, W. G. Humphries, Chas. I. Ryan, R. R. Arnold, John J. Woodside, Jr., Chas. H. Black and J. T. Tucker. For convenience in transacting business all officers named were Atlantans but vice-presidents will be named in various parts of the state, who will be ex-officio members of the board of governors.

It was decided to have two forms of membership, Atlanta and state. This was made necessary because it is planned to open a clubhouse in Atlanta. The initiation fee for Atlantans will be $10 and the dues $18 a year. For state members the initiation fee is $5 and the dues $6.

Board of Trade Re-elects Officers

IN RECOGNITION of his successful leadership of the Automobile Board of Trade during the past year, the manufacturers in that organization, at their annual meeting Tuesday, reelected Charles Clifton of the Pierce-Arrow Motor Car Company to the presidency. All the other officials that served during the past year were unanimously returned to office.

In connection with good roads, legislation and patent matters, the organization has been active.

Reports were made by the various committees, all of which were re-appointed for 1912. This committee work involves patents, general trade, statistics, shows, legislation and law, intercourse and arbitration, good roads and mechanical improvement.

A full list of the officers elected, besides Col. Clifton, the president, is as follows: C. C. Hanch, vice-president; Benjamin Briscoe, secretary; George Pope, treasurer.

Directors: Charles Clifton, C. C. Hanch, S. T. Davis, Jr., Benj. Briscoe, Hugh Chalmers, S. D. Waldon, W. C. Leland, and H. A. Bonnell, general manager.

Following is a full list of the committees for 1912:

Patents—C. C. Hanch, W. H. Van Dervoort, L. H. Kittredge, L. E. Latta, A. Macauley.

Trade—H. O. Smith, E. R. Benson, W. E. Metzger, C. W. Churchill, W. T. White.

Statistical—Benj. Briscoe, E. P. Chalfant, J. S. Clarke.

Show—George Pope, Alfred Reeves, M. L. Downs.

Legislation and Law—G. H. Stilwell, Albert L. Pope.

Intercourse and Arbitration—G. E. Daniels, W. C. Shepherd, J. W. Gilson.

Good Roads—R. D. Chapin, S. D. Waldon, J. N. Willys.

Publicity—Alfred Reeves, E. R. Estep, H. W. Ford.

Mechanical Co-operation—A. L. Riker, D. Ferguson, F. B. Stearns, C. W. Nash, H. E. Coffin.

The following were in attendance: Buick Motor Company, C. W. Nash; Cadillac Motor Car Company, W. C. Leland; Cartercar Company, W. C. Leland; Chalmers Motor Company, Hugh Chalmers; Corbin Motor Vehicle Corporation, M. S. Hart; Cunningham Son & Company, Jas., J. C. Dryer; Elmore Manufacturing Company, W. C. Leland; H. H. Franklin Manufacturing Company, G. H. Stilwell; Garford Company, A. L. Garford; Haynes Automobile Company, Elwood Haynes; Hudson Motor Car Company, R. D. Chapin; Locomobile Company of America, S. T. Davis, Jr.; Marquette Motor Company, O. C. Hutchinson; Matheson Automobile Company, W. C. Shepherd; Metzger Motor Car Company, W. E. Metzger; Moline Automobile Company, W. H. Van Dervoort; Moon Motor Car Company, E. J. Moon; National Motor Vehicle Company, Geo. M. Dickson; Nordyke & Marmon Company, C. C. Hanch; Oakland Motor Car Company, G. E. Daniels; Olds Motor Works, W. C. Leland; Packard Motor Car Company, M. J. Budlong; Peerless Motor Car Company, L. H. Kittredge; Pierce-Arrow Motor Car Company, Charles Clifton; Pope Manufacturing Company, George Pope, A. L. Pope; Premier Motor Manufacturing Company, H. O. Smith; Rapid Motor Vehicle Company, W. C. Leland; Reliance Motor Truck Company, W. C. Leland; Selden Motor Vehicle Company, R. H. Salmons; Stevens-Duryea Company, W. H. Whiteside; U. S. Motor Company, Benj. Briscoe, Alfred Reeves; Warren Motor Car Company, Homer Warren; White Company, W. T. White; E. R. Thomas Motor Car Company, J. J. Ramsey; Willys-Overland Company, G. W. Bennett; Winton Motor Carriage Company, C. W. Churchill.

The Automobile Board of Trade now consists of fifty members, the latest accession to membership being the International Motor Company, which was actually elected in December, but which was accepted January 8. This company was formed last summer by the merger of the Mack and Saurer interests and will operate both factories which are located at Allentown, Pa., and Plainfield, N. J., respectively. The product of the Saurer plant will be shown at Madison Square Garden during truck week in the space contracted for by the Mack company before the consolidation was effected.

The Board of Trade is now of the same size as the A. L. A. M. was at its high-water mark. Then it had just an even fifty members. But the old organization in addition to its membership had thirty-four licensees who co-operated with it in all its activities.

Reduction in Tire Prices to Dealers.

The majority of the tire manufacturers have been busy during the last 2 days on what appears to be a cut of approximately 5 and 10 per cent. on tire prices to dealers, the reduction being 10 per cent. to preferred tire dealers and 5 per cent. to the regular dealers. This price reduction will not in any wise affect the price of tires to consumers, so far as it appears at present. The exact reason for the price reduction seems to be among the tire interests, and is not due to any reduction in the price of raw materials, any surplus of these materials or changes in methods of tire manufacture.

During the last year there has been much activity in the wholesale tire business. Some tire makers have been opening tire depots throughout the entire country in cities of medium size, the object of this system being to give better service to the tire dealer. It is also a fact that during the past year certain of the tire makers have been particularly active in securing large contracts with car manufacturers, and this price reduction to tire dealers is in some quarters construed as an effort to reach the consumer through other channels than by the car manufacturer.

Two New Members Elected to M. & A. M.

The election of two new members to the Motor and Accessory Manufacturers was the chief business accomplished at the meeting of the Board of Directors of that organization Tuesday afternoon. The new members are the John L. G. Dykes Company, of Chicago, and the Cotta Transmission Company. The directors finished up their report and at midnight Tuesday the term of the board expired. Its successors will be selected at the annual meeting Wednesday.

M.A.M. Selects New Directors

H. T. Dunn, L. M. Wainwright and E. S. Fretz were re-elected to the board of directors of the Motor and Accessory Manufacturers at the annual meeting Wednesday for terms of three years. T. C. Billings was chosen to succeed F. E. Castle, who retired from the board. The directors will assemble Friday morning to elect officers for the year.

Bicyclists Hold Annual Dinner

Bicyclists of the past, present and future gathered at the Hotel Earlington at 10 o'clock last night and enjoyed an elaborate dinner. There were nearly 170 present, representing both dealers and users of bicycles, motorcycles and automobiles. J. H. Niesman presided.

Interesting Lectures at the A. C. A.

Prof. Frederick R. Hutton Lectures on the Carbureter

AT a meeting held under the auspices of the Automobile Club of America, on Tuesday evening, Professor Frederick R. Hutton, late dean of the School of Mechanical Arts, Columbia University, and Charles M. Manly, inventor of the Manly hydraulic speed control, engaged the attention of a gathering of about 400 members of the club. A large number of those present were members of the S. A. E., who appreciatively followed Professor Hutton's lecture on the development of the carbureter and Mr. Manly's paper on his hydraulic drive. After the lecturers had closed their addresses and answered the questions presented to them, supper was served to the members and guests of the club in the assembly room.

Professor Hutton traced the development of the modern carbureter from its early stages to its present form. Lantern slides were used to illustrate the various points in his address and to show the problems involved in carbureter design. The first part of the lecture was given over to a brief talk on the subject of the gas producer and its use in connection with large gas engines. Producers of the pressure and suction type were shown and the form now being adapted to marine use was also illustrated. The early forms of the carbureter were then discussed and great interest was shown in the development that has taken place since the early days of the Maybach, which was the first float type of carbureter relying on the suction of the motor to draw forth a jet of gasoline mist. The wick carbureter was also commented upon. A double carbureter was shown having two independent floats, one using gasoline and the other alcohol, kerosene, or some other of the less volatile fuels. With this type of carbureter the idea was to start upon the more volatile liquid and then to pass over to the other after the car was running. The remainder of the professor's lecture was devoted to a description of a test plant for carbureters which had been arranged by the technical committee of the club, with a view of making complete tests on all makes of carbureters. The hygrometrical conditions of the air and the quality of the gasoline used in connection with the tests are carefully measured by instruments adapted for the purpose. The motor, a six-cylinder Pierce, is used in connection with a dynamometer for making the various tests, while provisions for accurate exhaust gas analysis are also made. In this way the intake and output of the engine along with the losses due to incomplete combustion can be readily determined. Provisions are also made to determine the temperature and weight of the water passing through the cooling system so that there is no trouble in securing a complete record of the performance of the engine. The final views shown illustrated the carbureter action in detail. A vessel containing permanganate of potash represented the fuel tank and the feed tube ran from this into the compartment representing the mixing-chamber of the carbureter. Surrounding this tube, which narrowed into a jet, was the air tube, thus forming an annular jet about the feed-jet. The house vacuum cleaning system was attached to a tube which entered the mixing-chamber and performed the office of the suction of the motor. When the throttle was opened the spraying action of the jet was very clear on the screen. The action of the fuel when the device was throttled and under varying relative quantities of air was made very apparent. A point of special interest was the thick stream of fuel produced by choking the air supply as is done in many of our newest carbureters to procure a rich mixture for starting purposes.

Charles M. Manly Discusses Hydraulic Speed Control

FOLLOWING the address of Professor Hutton an interesting paper was read by Charles M. Manly on the features and operation of the Manly hydraulic speed control. After touching on the conditions which make necessary the use of some form of gearshaft mechanism or variable speed control for motor vehicles Mr. Manly continued in part as follows:

"The method by which the speed is controlled on a vehicle equipped with Manly drive is in direct contrast to that of a car equipped with the usual change-gear transmission. On cars equipped with this drive there is no clutch, no change-gear, no differential gear and no service brake. The drive which replaces these parts consists fundamentally of an hydraulic pump having its crankshaft direct-connected to the crankshaft of the engine and two hydraulic motors, each having its crankshaft connected by chain and sprockets to the rear wheels, these two motors being connected by suitable piping to the single pump. The pump is so constructed that the length of stroke of its crank can be varied from zero, or no-stroke, to any length of stroke between this and a maximum even while it is rotating at any speed. By this means the working fluid or lubricating oil, which entirely fills the pump and hydraulic motors and the pipes connecting them, is circulated from the pump to the motors and back to the pump at a speed in exact proportion to the length of stroke of the pump crank, thus causing the fluid pressure from the pump to drive the motors, and consequently the car, at a proportionate speed. As the adjustment of the length of stroke of the pump crank from zero or no-stroke to maximum is a continuous adjustment through all possible positions between these two extremes, the range of speed is continuous between zero and maximum, and, since the pump stroke can be varied as rapidly and freely as desired by the driver, there is no need whatever for any flexibility on the part of the engine. In fact, it is recommended that the engine on these cars be equipped with a governor, thus relieving the driver of all attention to the engine in the general operation of driving, a lever or pedal-operated throttle being provided by which the engine can be slowed down, thus saving fuel when the car is standing still or when for any reason the full speed of the engine is not desired.

"Since the speed of the hydraulic motors is varied by varying the length of stroke of the pump crank, their torque or pulling power increases in exact proportion to the decrease in speed.

"The small amount of power required from the engine in order to develop the full tractive effort at slow speed on a vehicle equipped with the drive is perhaps better impressed on a person acquainted with gasoline engines through witnessing the facility with which one of the fully loaded five-ton trucks can be started forward or backward, even when on a considerable grade, while the engine is throttled down to a speed of 140 r.p.m.

"That the power required from the engine is so nominal is still further impressed by shutting off the engine entirely and having the driver take the starting crank and, by merely turning this by hand, make the truck follow him either forward or backward at will."

In order that some of the features of the drive, especially the small amount of power required to start or reverse the hydraulic motor when it was carrying full load, could be better appreciated, one of the machines was shown in actual operation. Since a five-ton truck could not be brought into the room, a separate drive was operated by an electric motor, the power being taken off at the other end of a dynamometer.

A Busy Fortnight Ahead for the

Annual Meeting and Election—Committee and Sub-

THE preliminary work of the Society of Automobile Engineers for its annual session Jan. 18, 19 and 20, in Madison Square Garden during the closing days of the commercial show, is of such a nature that it augurs well for the session. Without question much advancement is going to be accomplished. The interest is greater than ever before, and the different sub-standardizing committees, which have been meeting practically every day this week and will have sessions practically every day next week, are accomplishing much. They are filled with heated and in some cases violent discussions which are often necessary to produce good results. New enthusiasm was thrown into the S. A. E. circles today by the arrival from England of H. F. Donaldson, nominee for president of the Society for the coming year. Mr. Donaldson went abroad with the engineers on their European visit the end of October and since then has been studying commercial vehicle conditions on the other side.

Mr. Donaldson, in speaking of his impressions on the commercial vehicle situation abroad, said:

"I was somewhat disappointed at the present status of the commercial vehicle in Europe, when viewed numerically. I had anticipated that in London and Paris many more vehicles would be in operation, but there seemed to be many reasons why this is not so. In London the excessive traffic slows the speed of the vehicle so much that the efficiency is greatly curtailed. The street surfaces are much better than in American cities and the tire mileage is a little greater but not so much as has been reported. At present the number of commercial vehicles is purely fractional as compared with the number of horseless vehicles in use.

"One important difference between the commercial vehicle industry abroad and that in America is that constructional design is more orthodox in England and France than in America. This is due to the fact that it is much more difficult for a new company to start out in the manufacturing business in Europe than it is here. With us a man may have been a butcher yesterday, and next week a builder of commercial vehicles. Such conditions are not possible on the other side."

The annual dinner of the society scheduled for Friday, Jan. 19, at the Hotel Astor, at 7 p. m., is meeting with general approval. Last year 330 attended this dinner. This number will be eclipsed this year, as more than 200 requests have already been received.

The most interesting sub-committee work to date is that of the iron and steel standardizing division. Last June at the midsummer session at Dayton, Ohio, much heated discussion was provoked between the different steel interests over the steel specifications that were passed upon by the general standards committee. The sub-committee has this week had two or three sessions. These steel, iron, and other specifications have been revised and new ones added, so that the list is of wide range. There will be more sessions of this sub-committee on Saturday.

Most important work is being done by the sub-committee on electric lighting. This committee represents many of the electric light manufacturers. In their work they are taking up the matter of standardizing the style of base for incandescent lamps for car use and also standardizing voltages, etc.

The sheet metal division has prepared a comprehensive report on the use of non-ferrous alloys for sheet materials, tubings, etc.

In the ball and roller bearing division the matter of tolerance has been gone into and the committee has some definite reports to make in this matter.

An important meeting on Friday is that of the truck standardization sub-committee. One of its problems is arriving at some basis of rating truck capacity. At present some makers sell a truck for two-ton, and also sell the same chassis for three- or three-and-one-half-ton.

As a final matter in the various preliminary work of the standardization committees there will be a general meeting Tuesday, Jan. 16, of the entire standards committee, in which all the reports from the various sub-committees will be acted upon, and these reports accepted, revised, or rejected, so that there will be definite reports for the meeting of the Society at the end of the week.

Program of S. A. E. Annual Meeting

The winter meeting of the Society of Automobile Engineers, which will be held in the Assembly Hall of Madison Square Garden January 18-20, will doubless prove intensely interesting to the technical factory experts who have congregated in New York to attend the shows. The schedule, which will be adhered to as closely as possible, is as follows:

THURSDAY, 9:30 A. M.

Address by President Henry Souther. *Business Matters—*

Upholds Rubber Contract.

Henry A. Gould Company, a corporation engaged in crude rubber importing and sale secured a reversal of the judgment of the United States Circuit for the Southern District of New York, which awarded the Pennsylvania Rubber Company damages of $11,772.72 based upon a rubber contract.

The United States Circuit Court of Appeals reverses the findings of the trial court and the case is sent back for retrial.

The facts as they were alleged at the trial and in the brief of counsel for Gould outline a situation where the broker contracted to deliver a certain grade of merchandise, known to the trade as regular grade Manicoba. Part of the contract amount of rubber was delivered and received but the remainder was rejected by the chemist of the Pennsylvania company because he found that it would not vulcanize evenly. The contention of the Gould company was that the rubber delivered was in accordance with the terms of the contract and that the fact that it would not vulcanize according to the ideas of the Pennsylvania company was not material to the validity of the contract.

The lower court held that it was material and the upper court reversed the findings.

Klaxon Gets Decree Against Phillips

Final decree has been entered by consent in the suit of the Lovell-McConnell Manufacturing Company, against Henry Phillips, doing business under the name of the H. Phillips Rubber Works. The Lovell-McConnell company sued Phillips for infringement of three basic Klaxon patents in the United States Circuit Court and the decree declares the validity of the patents and enjoins the defendant from infringing.

Society of Automobile Engineers

Committee Meetings with the Banquet as a Wind-Up

Treasurer's Report; Report of Tellers of Election of Members; Election of Officers; Miscellaneous Business Matters. *Professional Session*—Iron and Steel Specifications, Report of Standards Committee, Henry Souther; Note on Proportional Elastic Limit and Elastic Limit, Henry Hess; Non-Ferrous Alloys for Sheets, Rods and Tubes, Report of Sheet Metals Division, Metal Gauges, T. V. Buckwalter; Report of Ball and Roller Bearings Division, David Fergusson, chairman.

THURSDAY, 2 P. M.

Professional Session—First European Visit of the Society, introduction by Henry F. Donaldson. *Topics*—Wire vs. Wood Wheels, paper by Bert Morley; Worm Gears, paper by C. B. Hayes; Non-Poppet Valve Motors, J. B. Hull; Minor Points and Peculiarities of Foreign Motor Car Design, paper by W. G. Wall; Silent Chains, paper by Chester S. Ricker; Standardization of Drawings, George W. Dunham.

THURSDAY, 8 P. M.

Professional Session—Mechanical Points in Connection with the Construction of Solid Tires, paper by Charles B. Whittelsey; Auxiliary Loading and Unloading Devices, paper by E. W. Curtis, Jr.; Motor and Transmission for Commercial Cars, paper by Eugene P. Batzell. Standards Recommendations: Report of Wheel Dimensions and Fastenings for Tires Division; Report of Truck Standards Division, William P. Kennedy. Report of Commercial Vehicle Division of first S. A. E. European visit: Light Gasoline Vehicles—Marketing and Use, A. B. Cummer; Trend of Design, B. B. Bachman; Steel Wheels, A. J. Slade; Heavy Electric and Gasoline Vehicles, Robert McAllister Lloyd.

FRIDAY, 9:30 A. M.

Professional Session—Report on Magneto Dimensions; Automobile Electric Lighting Outfits; S. A. E. Spark Plug Thread Tolerance; Gasoline Specification; Standard Gauge for Pleasure and Commercial Cars; Over-size Pistons; Miscellaneous Division of the Standards Committee, A. L. Riker, chairman; The Importance of Consideration of the Magneto in Engine Design, F. E. Moskovics; Automatic Spark Advance, paper by Lon R. Smith.

FRIDAY, 2 P. M.

Professional Session—On Constancy of Gasoline Diffusion and Homogeneous Carburetting of Air and the Evolution of a Practical Method of Introducing Same Into the Fuel-Generating Apparatus of Motor Vehicles, paper by Forrest A. Heath; Compound Gas Engines, paper by Eugene P. Batzell; Report of Frames Section, J. G. Perrin, chairman.

FRIDAY, 7 P. M.

Annual society dinner, Belvedere Room, Hotel Astor.

SATURDAY, 9:30 A. M.

The Balance of Automobile Motors, paper by Ernest R. Fried; Starters for Gas Engines, paper by J. W. Fitzgerald; Report of Broaches Division; Report of Carbureter Division; Report of Springs Division, A. C. Bergmann, chairman.

Schrader Twitchell Suit

Answer of A. Schrader's Sons, Inc., in the suit of the Twitchell-Garvey Manufacturing Company, of Los Angeles, involving the alleged infringement of the Twitchell air gauge patent was filed in the United States District Court Monday. The Twitchell company charged in its complaint that its basic patent was being infringed by the New York company and asked for an injunction and the usual relief provided in equity. The answer is a denial of infringement by the defendants and the setting up of a patent now owned by the Schrader concern, which is dated March 1, 1898.

The defendants claim that the Schrader gauge is materially different from that of Twitchell, so different in fact as to take it outside the Twitchell patent, entirely aside from the difference in dates at which the controversial patents were granted.

The Twitchell company has announced that in future it will sell its various products direct to dealers by a branch house system.

Winding Up Big Suit Against A. L. A. M.

MILWAUKEE, WIS., Jan. 8—The decision of the late Judge Joseph V. Quarles, United States District Court, Milwaukee, sustaining the demurrer of the Kopmeier Motor Car Company in the suit of the Velie Motor Vehicle Company, of Moline, Ill., has been upheld by the federal circuit court of appeals at Chicago. The suit of the Velie company was for $500,000 damages and included as defendants fifty-seven manufacturers then members of the A. L. A. M., with the Kopmeiers as co-defendants, alleging conspiracy in restraint of trade and intimidation of dealers. In addition, breach of contract was charged against the Kopmeier company.

S. A. E. Springs Division Finishes Report

Final touches were put upon the report of the Springs Division of the S. A. E. Standards Committee at a meeting held at the headquarters of the society on Monday morning. Chairman A. C. Bergman presided. The report when it is presented to the Standards Committee will contain an outline of the nine prevalent types of automobile springs with comprehensive definitions.

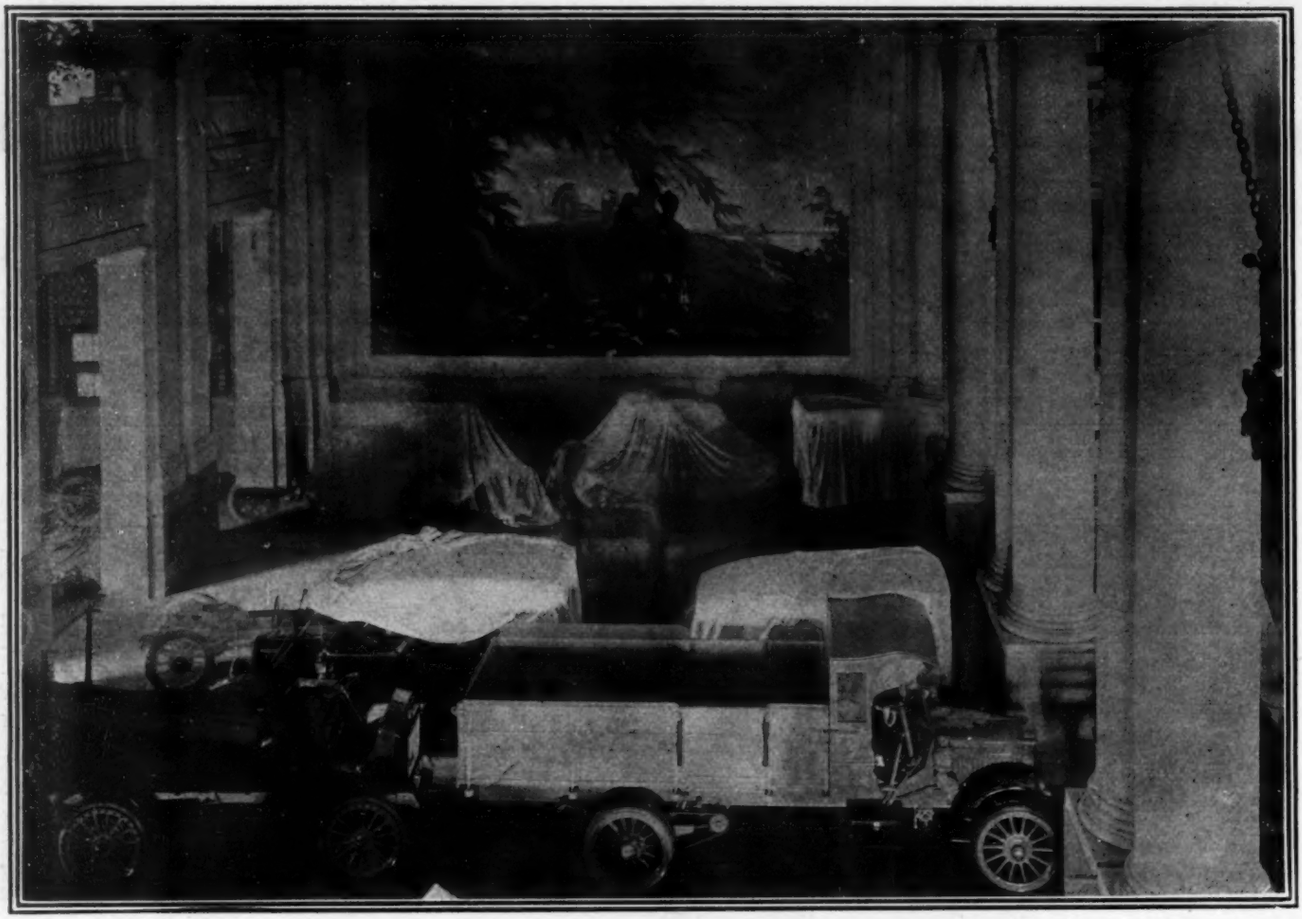
The most important portion of the report is the recommendation that order blanks be prepared for the use of engineers in ordering springs. These blanks will contain mechanical drawings of the various types of springs with full directions for ordering and will be in such form that they can be removed like the leaves of a paper block at the pleasure of the user. A section will be arranged to specify the chemical composition of steel, load weights, deflection, total weights, distance from adjacent parts, various specifications and tolerances.

Two definite recommendations will be embodied in the report. These are where two nibs are used, the bolt should be 3-8 inch in diameter and 3-4 inch from center to center. The other is in favor of rebound clips and S. A. E. threads.

Two S. A. E. Committees Meet

Two preliminary meetings of divisions of the Society of Automobile Engineers were held Wednesday. In the morning the Lighting Outfit Committee held a short session to formulate its report which is to be submitted to the organization at its annual meeting.

In the afternoon the Council of the organization held a session to arrange some of the details of the program for the annual meeting. Both meetings were held at headquarters.



Within the first colonnade, showing some of the cars ready to be raised to the second floor by an immense electric elevator

Grand Central Palace Auto Show

Complete Exhibits Number Seventy-two, Including Gasoline and Electric Cars

STAGED in the most wonderfully beautiful exhibition hall that ever housed an automobile show, the annual show at the new Grand Central Palace opened last night to a full attendance. The Palace is brand new; it represents the latest expressed ideas in construction and while the interior, particularly the main floor, is cut up by ranks and files of pillars, the pillars themselves are a most attractive feature.

Perhaps the building has presented some knotty problems to the show management in the matter of space divisions, but surely those problems have been solved with skill.

Three floors have been fitted for exhibition purposes and they are comfortably and artistically filled with pleasure cars, both gasoline and electric; commercial vehicles and delivery wagons and accessories of various sorts.

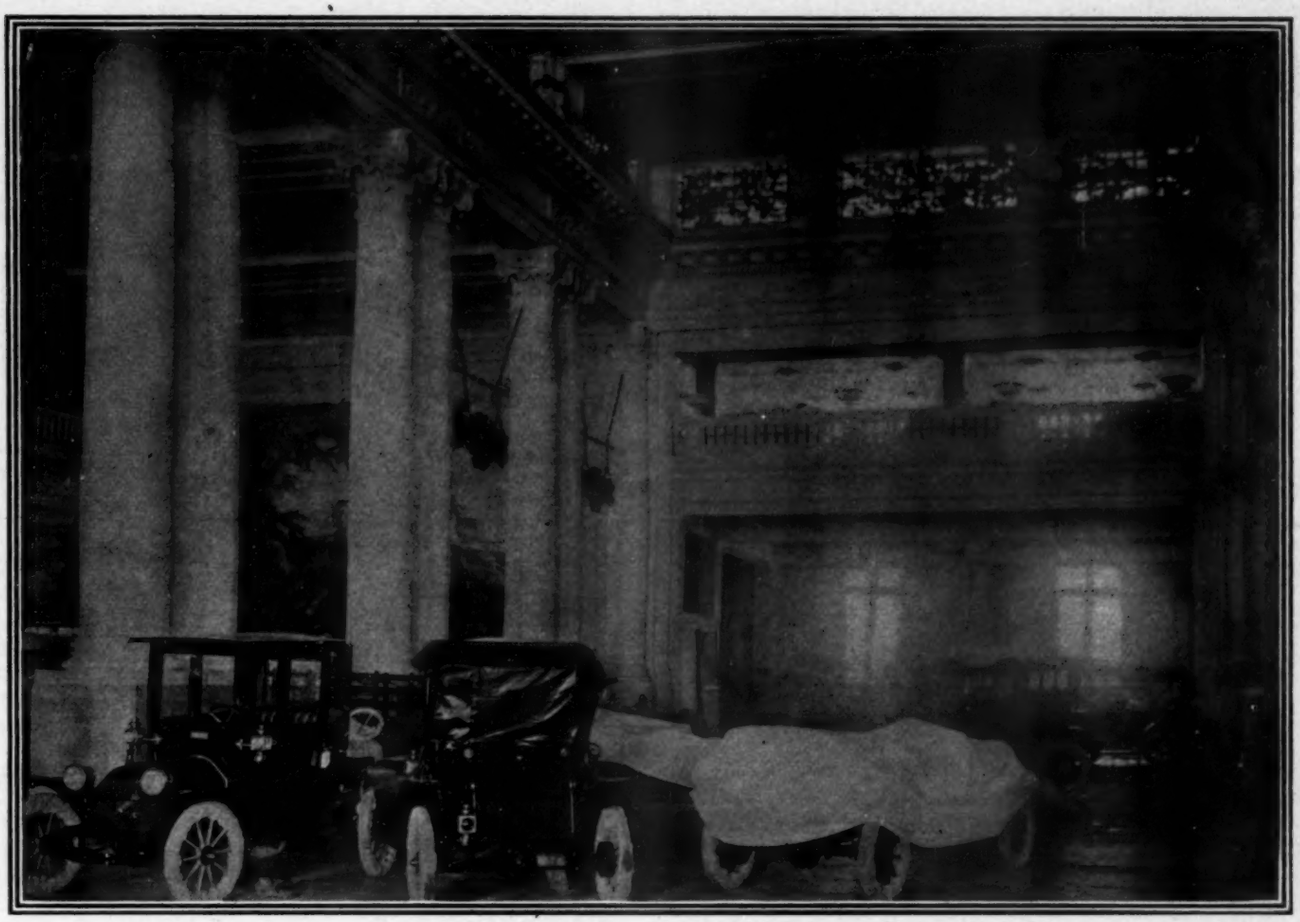
The entrance to the main floor is from Lexington avenue, a grand stairway leading up from the street level through a high corridor lined with cream-colored stone. If it were not for the cars and crowds the view from the top of the stairway through the exhibition hall might seem almost like a glimpse into a Grecian temple, but that impression is instantly dispelled by the modernity of the contents of the hall.

Immediately in front of the stairway are three rows of Corinthian columns, fluted and capitaled in all the beauty of Greece. These columns stretch across the hall from north to south and divide the center of the building into two great subdivisions. The second and third rows of columns outline a rectangle running across the middle of the building that for sheer, chaste beauty will prove a revelation to a majority of the visitors. They extend upward to the fourth floor of the building, leaving an open space on the second and third floors. This affords the opportunity for some balcony and latticed effects, full advantage of which has been taken.

There is a grandeur in the sweep of this colonnade that is inspiring. The whiteness of the pillars, the soft tones of the stone and the majestic height of the ceiling all combine to produce a remarkable result.

All around the edges of the hall the ceiling is lower and the floor spaces are taken up with various kinds of automobiles. The central subdivisions are cut up into show spaces.

Any garish color scheme of decoration would be out of place and the management has wisely determined to confine its decorative efforts to placing palms and a few flowers here and there. The plan of decoration of the balcony of the second floor is the most elaborate effort of the show and it consists of a few dozen potted plants with great red blossoms ranged around the court. The upper floor is also severely simple in its decorative treatment for wreaths of autumn leaves, trailing from the lattice that surrounds the court, is its sum total.



A glimpse of the interior of the main floor at the Palace showing the simple decorative scheme used to emphasize its beauties

Opens Amid Architectural Beauties

Decorative Scheme Is Simple, Consisting of Flowers and Well-Executed Paintings

But the general effect is pleasing in the extreme, seeming to bring out and emphasize the lordly colonnade.

On the main floor there are twenty-eight makes of gasoline pleasure cars; one electric and two big commercial vehicles on show. The cars shown include such sterling automobiles as the Rambler, Abbott, Warren, Fiat, Paige, Velie, Imperial, Cole and others of as much class in their various divisions. In size they range from the Hupmobile, R. C. H., Krit and Herreshoff to the powerful Kline and Great Western. In price their range runs the full gamut of the modern automobile for a buyer can spend quite as much for a car at the Palace as he can at the Garden.

The trucks shown on the main floor are the Gramm and Kelly, immense cars of so much body length as to make their transportation to the second floor.

Referring to the measures adopted to lift the show cars and trucks to the second floor, the elevator used was most ingenious. It was found that the regular elevators would not answer the purpose at all, being too small to accommodate the huge bodies, even if they were able to lift the heavy weights. To solve the problem the elevator was erected on the floor of the main hall, almost at the head of the staircase. Steel uprights and girders were bolted together and a platform lift, capable to raise 14,000 pounds was installed. As some of the cars weigh approximately that amount, the full capacity of the elevator was frequently tested.

The process of loading the trucks on this elevator was somewhat complicated. Naturally, the cars were not allowed to enter the building under their own power, as gasoline is positively under the ban, even in small quantities. The means used embraced the running of the show cars up to the entrance under tow and then attaching the tow rope to a giant electric truck which yanked them firmly but gently up to the loading stage. A little careful engineering of the towed cars put them squarely upon the lift, when the tow rope was disengaged and the power applied to the elevator.

It required as much as 4 minutes to raise some of the trucks to the second floor where the balcony had been cut away and a landing stage prepared. There was no big electric truck above stairs to pull the cars from the elevator and the placing of the exhibits was a job for human power. Sometimes it took the combined efforts of a score of big, thick hustlers to move a truck, but everything was done with mathematical precision. Practically all the principal exhibits were in place Tuesday night, and all were ready by midnight.

Then a gang of workers was put to the job of disassembling the elevator and storing it where it will be available for quick use when the show season is over. It took the gang from midnight until 10 o'clock yesterday to complete the dismantling of

Looking down the south corridor on the second floor of the Palace showing mixed exhibits of pleasure and commercial cars

the elevator. The use of this device cost the show management in the neighborhood of $3,000.

The main floor contains a trifle more than 28,000 square feet of available show space, making allowances for the space used for the stairway, aisles and columns. The dimensions of the floor without allowances of any kind are approximately 200 by 300 feet, or 60,000 square feet. Besides the main stairway, there are four other sets of stairs and space for a freight elevator, to be deducted from the total floor area.

The second floor has about 25,000 square feet of show space, the court taking up about 150 by 100 feet and the stairway and elevators considerably more in addition.

The exhibits on this floor are largely in the line of commercials although there is a sprinkling of first rate pleasure cars also. The big models of the Commer line had the elevator strained to its capacity to raise them into position. All told there are forty-one makes of business and pleasure automobiles on the second floor, divided in the proportion of about three to one. Several of the exhibitors are showing both business and pleasure cars.

The exhibits are ranged on three sides of the open court and completely around the four walls of the building with a clump at the two eastern corners.

On the third floor is located the accessory exhibition. A typical show of sundries is on display. It is not anywhere near the size or scope of that at Madison Square Garden but it is descriptive and instructive nevertheless. Most of the leading tire companies have space and ignition and carbureters are shown in several varieties. There is a representation in all the other lines.

In all sixty-three companies are showing in this section. The show space on the third floor extends only as far back as the court. This is approximately half the east and west length of the building. The court opening upon the third floor is much smaller than it is on the floor below. The south side of the remaining space is divided off from the rest of the floor and has been fitted up as a restaurant. The band also will be stationed on this floor near the court so that the music can be heard in all parts of the exhibition spaces.

The actual show space on the third floor is about 12,000 square feet, thus the total of the three floors is 65,000 square feet. This, of course, only includes the actual space sold to exhibitors, for the total, reckoned on the usual basis and making no allowances would be not less than 130,000 square feet.

Samuel A. Miles, general manager of the National Association of Automobile Manufacturers has installed a similar admission system to the one in use at Madison Square Garden. The experience derived from former affairs of this kind resulted in the conclusion that a change was necessary and when Mr. Miles visited England some time ago he noticed with particular care the plan adopted in this regard by the foreign showmen. So far it has worked satisfactorily at Madison Square Garden and on opening night no fault was found with its operation at the Palace. It differs slightly from the system used at the Garden on account of the different form of the entrance to the building.

The present show would rank high anywhere as a display of the automobile art. Practically every worthy feature in the present stage of the industry is represented in an interesting manner. Among the pleasure cars there are numerous examples of the six-cylinder idea of construction, but the backbone of the show is the well tried and proven lines of four-cylinder cars. In the line of enclosed bodies there are a few types exhibited that rival in luxury and appointments the glorious array at the Garden, but as a general rule the cars are shown with open bodies. Few stripped chassis are on the floors, the mechanical details of the various types of motors being shown with working models of the motors detached from the chassis.

There are no changes on the first floor from the arrangement announced hitherto, but on the second floor the space originally contracted for by the Progress Development Company was given up by that concern and was taken over by the Schlotterbach Manufacturing Company. The space of that company was then sold to the Rowe Motor Company, thus practically filling the floor.

Changes at the eleventh hour were quite numerous on the third floor and the final line-up found the S. F. Bowser Company among the missing. The James Thomas Company, Hercules Company, C. R. G. Manufacturing Company and the Deflector Shield Company have been added since the last announcement was made by the management. There has also been some shifting here and there, but in other respects the line-up is practically as announced in THE AUTOMOBILE.

A determined effort is being made by the sales forces of the

various exhibitors to excel the proportionate showing of sales made at Madison Square Garden. On the general average the pleasure cars are somewhat lower in price than the cars of the Automobile Board of Trade, although throughout the industry the classes run along nearly parallel lines.

Among the trucks the price range is quite as high as those of the trucks to be shown at the Garden next week. Some of them, in fact, are higher. The class idea obtains with fully as much force with regard to commercial cars as it does in the pleasure lines.

In the past much success has been achieved in selling at the Palace shows and there is no reason to believe that there will be any falling off in this respect in 1912.

The most careful preparation has been made to insure a great attendance at the show. The exhibitors at the Palace went down to the Garden for one session and the compliment will be returned by a visit of courtesy on the part of the Automobile Board of Trade. The system of invitations to dealers and prospective users of both pleasure and commercial cars has been worked out with detailed fidelity. Something over 10,000 special personal invitations have been sent out by the management to persons who, as individuals or as officers of firms or corporations, are now using or who may use some form of automobile transportation.

These invitations have not been sent in haphazard fashion, the list having been prepared with scrupulous care and the individual needs of the prospect have been considered from the individual viewpoint.

The list has been worked over and over since the first space allotment was decided upon and the management point to it with much pride as a demonstration of activity on its part.

A comprehensive system of ticket distribution by the exhibitors themselves has been installed, being a modification of the one in use last year at the Chicago show. In its essentials it is the same. The idea is to have the exhibitors buy as many admission tickets as they desire, paying for them when delivered. Then the tickets are sent to the prospective customers of the exhibitors and at the end of the show, the tickets that are taken in at the gates are checked up against the number sold to a particular exhibitor. If all the tickets have not been used, the exhibitor receives a rebate covering the difference between the number he bought and the number that were taken up at the gates.

In this way the exhibitors are protected from exposing the names of their prospective customers and the management is protected against the ticket abuses of former years.

Next year the annual automobile show in New York will be held partly in the Palace, according to present plans, but in addition to the present building there will be another giant structure situated in the immediate neighborhood. This will be a building designed to fill the place of Madison Square Garden, but with a larger seating capacity. The plans for the new structure are still in the hands of the architects but the original draft has been approved by the New York Central and the alterations necessary are simply matters of detail.

The undertaking represents a much more complex problem than the construction of a great show hall. In addition to the exhibition hall there will be several auxiliary halls and an office building corresponding to the Palace in exterior appearance. The arena itself is not such a small undertaking as it will be for horse shows and other big gatherings in addition to its mission as the successor of the Garden in the automobile show field.

Such functions as the horse show require a foundation of at least 1 foot of earth and it is in the completion of such details of construction that the plans are now being worked over. If work can be commenced on the building by March, it can be completed by mid-fall and thus will be ready for the automobile show season of 1913.

The season of 1912 speaks farewell to Madison Square Garden and gives greetings to the new Grand Central Palace and there is much significance in both phases of the situation. The probabilities are that for years to come there will be but a single great automobile show in the metropolis, not regarding the annual exhibition of the importers in the light of competition or distraction. This view of the case is accepted by many leaders in the industry, not only on account of the improbability of holding a rival American show under prospective conditions, but also because the importers are not regarded as competitors.

Profound peace reigns in the kingdom of the automobile. The fierce battling that was in progress last year at this time and for several years before is at an end. There is no major litigation to threaten the foundations of the industry and progress is the universal watchword. All elements of the trade are in harmony and with undivided energy the business of producing automobiles for the more general use of the public is going on at an ever-increasing pace.

There is no real rivalry betwen the two big metropolitan shows except as it applies between individuals in the matter of sales or other details of a business character.

French Grand Prix an Anglo-French Affair

After all only one American car, and that a Ford, has been inscribed among the contestants in the joint "Grand Prix" and "Coupe de l'Auto" races—to be held over the Dieppe course in France during two successive days of next June—when the regular entry lists were closed on the evening of December 30. The boycott of the event by the German manufacturers which was announced immediately after the rules of the two races had been given to the public on December 1, and which was quietly joined by the Austrians, Italians and Belgians, has held tight, as may be judged from the following list of entries, comprising all contestants listed at regular entry fees. It includes 27 French cars, 15 English ones, 1 German car (which is made in Elsace, however) and 1 Belgian car.

General exterior view of Grand Central Palace

THE AUTOMOBILE

Vol. XXVI Thursday, January 11, 1912 No. 2

THE CLASS JOURNAL COMPANY

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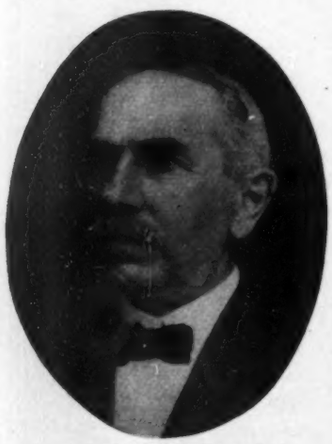
United States and Mexico - - - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

At the time of the purchase of The Class Journal Company by the United Publishers Corporation, H. M. Swetland kindly consented to remain President until the first of January, 1912. Now that the time for his retirement from the presidency of The Class Journal Company has arrived, it gives us great pleasure to state that Mr. Swetland continues a Director of the United Publishers Corporation.

Horace M. Swetland



HORACE M. SWETLAND

WITH this issue of THE AUTOMOBILE, Horace M. Swetland, who from the first has been its guiding spirit, retires from the presidency of The Class Journal Company, over which he has presided for so many years.

Mr. Swetland's name has been a power in the publication field since his entry into it more than two decades ago. His spirit has been a dominant factor in determining the present status of class publication in this country. His influence has been country wide and the ideals he has established have taken a permanent place in the present structure of trade publications. His retirement from active direction of the affairs of The Class Journal Company means that the publications over which he has presided come under my direction and management. I am fortunate in my predecessor, for it is my agreeable task to take over publications that have been developed from mere ideas to great properties—publications that under the guidance of Mr. Swetland's foresight, sound judgment and great organizing ability, have been raised to positions of unquestioned leadership among the publications of their kind.

And more important still, the whole automobile industry is fortunate in having had Mr. Swetland as the leader of its journalism. In view of the extremely important part which the trade and technical newspaper plays in the modern system of production and distribution, that industry is fortunate indeed whose chief organs of publicity are established upon a solid bedrock of principle and skilled service—such leaders give tone to the whole press of the industry, for its contemporaries have but little chance to live unless they strive to reach the standard thus set for them.

Whatever, from time to time, Mr. Swetland's vocation may have been, he has taken it seriously; he has given it the full measure of his ability and he has elevated it thereby. Whether it was teaching school in his boyhood home in western New York, or keeping country store, or getting news, subscriptions and advertising for a Boston technical paper some thirty years ago—the job was always squared with his principles of integrity and lifted to a higher plane. And so have trade and technical journalism been broadened and bettered by his quarter century in the publishing field, as controlling owner, at one time or another, of *Power*, the *Engineering and Mining Journal* and the group of automobile publications now owned by this company. He had no sympathy with the old class of scheme publishers, but insisted on rendering full value and service to both reader and advertiser. His life work has been to enhance the value of this service by giving more and more help to readers and thus increasing sales promotion work for advertisers.

For the invaluable service thus rendered to it by Mr. Swetland, the automobile industry is to be congratulated, and we take occasion upon his retirement from the presidency of The Class Journal Company, to pay him the tribute of a full recognition of what he has done in raising automobile journalism to its influential status.

It is an honor and inspiration to follow a man of such high aims and acknowledged achievement. Not, of course, that the ultimate ideal has been reached. No one is better aware than Mr. Swetland that there are still many opportunities ahead of us to be grasped and utilized before these publications are brought to the point of greatest possible usefulness to the marvelous industry which they have the good fortune to serve.

The spirit and conditions of their field are such as to call for unique lines of enterprise, perhaps not yet exemplified in any existing class publication. It is to these problems that we now address ourselves, and on the solid foundation built for us by Mr. Swetland, and with the co-operation of an unequaled staff and the continued hearty response of readers and advertisers, we look to the future with confidence.—CONDÉ NAST,

President The Class Journal Co.

Accessories at the Shows

THE present automobile show in Madison Square Garden emphasizes more than ever before the large factor that the accessory plays in the automobile industry. The real beacon light of the present show is the self-starter, and this is an accessory. While it shares space on the main floor with the cars, being incorporated with the motor, it is nevertheless an accessory and as a factor of improvement must be placed in this class. The self-starter is everywhere. Everybody is talking about it, and in one form or another it will soon be on nearly everybody's car. The car-makers are demonstrating its operation on their motors. Instead of drawing attention to this or that feature of construction, they are now showing how simple it is to operate the self-starter. There are a few makers whose self-starters have not originated in the accessory field. Three or four concerns have developed their own types, and in designing the crankcase of their motors have had regard for the self-starter apparatus which has to be carried on it.

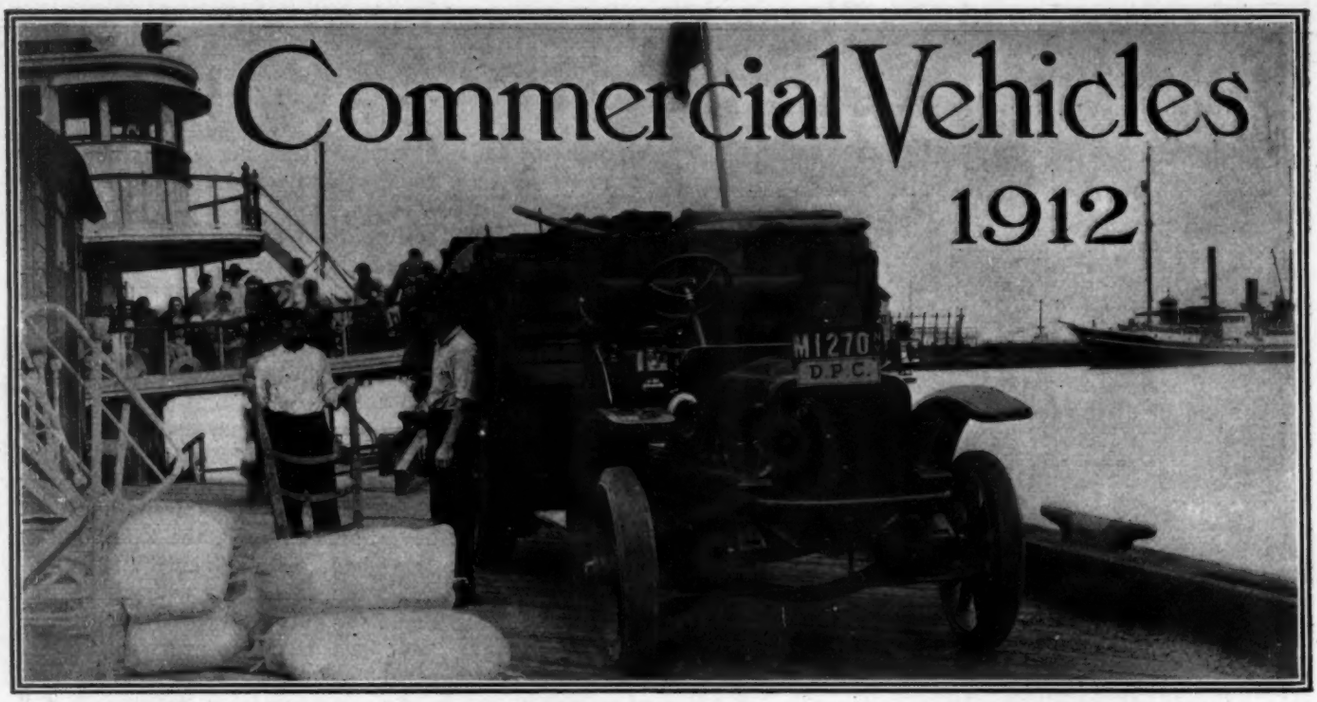
While a cursory glance through the accessory departments of the show may not be impressive from the point of view of fashioning car design, yet on closer inspection many dominant forces are exhibiting themselves. These are found in quite varied departments. To explain: Makers of gearsets are showing different models with the change speed and emergency brake lever mounted on the gearbox. This means that car-makers will take up with greater speed the problem of center control. It also means that the car-maker who has been in the habit of purchasing his gearboxes from a certain parts maker has now the opportunity of buying them with center control, or for the usual right-hand control. This makes it possible for the automobile builder to give an option, on either central or right-hand positions.

From the accessory field many of the things we mention can be traced. The magneto maker has always been up-to-date and he is maintaining his reputation at the present show. It is questionable if there is any other accessory maker that has kept closer in touch with the progress of the industry than the magneto man. He has followed the big racing events of the year and has had opportunity of discovering the shortcomings of his instrument. He has had his representatives on many of the big tours and reliability contests, and they have come face to face with the operation of the magneto in the hands of the owner. In this way it has been possible to remove many of the kinks as well as to note the shortcomings. As a result of this real practical experience many 1912 improvements are seen. A most notable one is the trend toward weatherproofing the instrument. Three or four makers, on their improved models, show how it is possible to keep the water out by metallic housings which enclose the magneto and also by special castings and stampings which protect the individual parts.

The magneto maker has gone far to meet public requirements. He is aiming at standardization. Last year the Society of Automobile Engineers introduced resolutions with the object of bringing to the attention of car makers the necessity of standardized magneto sizes so that a car builder could fit the different makes of magnetos without being compelled to resort to makeshift couplings or mountings. The result of this effort is apparent. Concerns that built larger instruments than standard a year ago have brought out smaller machines which are interchangeable with the standard makes. This is commendable. It helps the automobile builder and it helps the car owner. There are many times when the car owner, in remote sections of the country, has been put to great inconvenience on account of magneto trouble and the impossibility of installing a different make as a substitute for his own until repaired.

A leading British engineer in a recent paper on efficiency of motors took occasion to point out that motor efficiency is to-day as much a matter of carburetion as of engine construction. In this statement he struck a dominant chord. In recent races it has been demonstrated that a change of carbureter has meant as much as 8 to 10 miles per hour in the speed of the car. This is particularly true with the present high-speed motors. If a motor will generate a given horsepower at 1200 revolutions per minute it will practically double this at 2400 revolutions per minute. This extra speed is largely a problem of supplying the necessary explosive mixture. To do this valves have been enlarged, the cam contour has been altered, pistons have been lightened and a multitude of other details attended to, but with all of this there has been a demand for improved carburetion. The carbureter makers have been trying to provide this.

Space does not permit comment on the vast amount of activity shown by the other accessory makers. A few general examples will serve to show how widespread is this activity. One manufacturer of demountable rims has developed a model specially suited for cars selling at $1,000 or less. If he has a satisfactory product, and it is a manufacturing proposition, he should reap a bountiful harvest. Other makers are showing demountable rims specially intended for use on wire wheels. The wire wheel has not become a factor; in fact, it is scarcely heard of in America, but it will soon be asserting itself. Tire makers are more general in the manufacture of anti-skid treads, which goes to help the car maker in making his vehicle a more satisfactory all-the-year-round one. Windshield makers have come to the assistance of the automobile builder and are furnishing designs of windshields which act as a ventilator for fore-door bodies. Lamp builders are following in line with the coming demand for small dash lamps and are producing miniature designs well suited for incorporation in the cowl or scuttle dash. Other makers, not quite so enthusiastic in the small lamp field, are producing small-sized lamps for dash use. Speedometer builders are improving their instruments by adding reset fingers which enable the tourist to make corrections for mileage to accord with the readings of the route book now so generally used. Top builders have joined hands with the car maker and are producing a very satisfactory form of inclosed top for winter use. These are reasonably cheap and much superior to the conventional cape top with its flapping sides. Lubricant manufacturers have brought out everything that usage has deemed necessary for the successful operation of the automobile for summer and winter. The radiator manufacturers are altering their designs to harmonize with the new lines of the body creations and in every department of the accessory field there is evident rational improvement. The accessory maker is a dominant factor in the industry. Scores of the changes listed as improvements in the automobile are in reality improvements for which the accessory man should receive the credit.



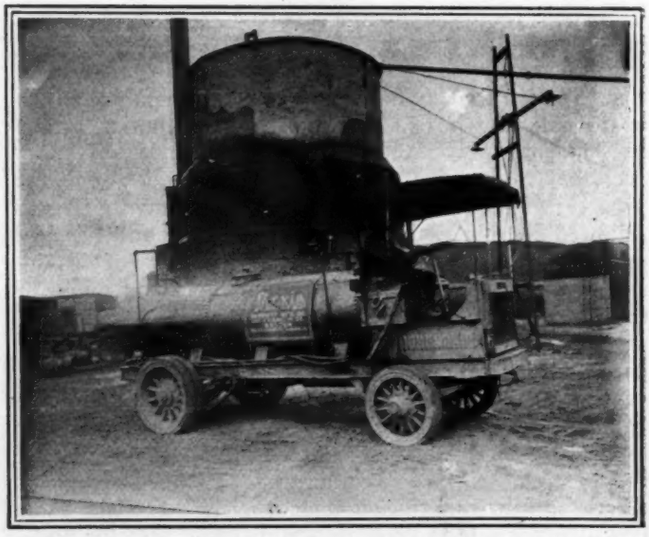
Where trucks are permitted upon the wharves they may be brought close to the loading gang planks of steamers

A review of the motor truck industry brings forth few radical changes in a mechanical way. The stroke-bore ratio shows a slight inclination towards becoming higher, and new recruits are joining the thermo-syphon and force-feed ranks, while pressed steel frames seem to be coming largely into vogue.

A REVIEW of the developments in the freight automobile field during the past year does not show quite as many new aspects as does an inspection of the pleasure car market, but the facts brought out by the former are no less significant. While it is true that most of the commercial vehicles have remained without radical changes during the last twelve months, the activity in that field is perhaps best illustrated by the statement that pleasure car makers of standing and matured success have decided to enter the freight field. Most important among these concerns are the Lozier and Locomobile companies. In their truck designs the principles of their standard constructions have been utilized to a large extent, with only such necessary modifications as the substitution of chain for shaft drive for the commercial design.

It would be impossible to design one average truck representing the aggregate specifications of American products, but freight automobiles may easily be divided into two groups, one having a capacity of below—and the other one above—1 1-2 tons. The first group uses motors either of the two or four-cylinder type, which are preferably cast separately, although quite a number of them are cast en bloc. The stroke-bore ratio is not must higher than 1 to 1, but it is a trifle higher than last year. Two-cycle motors there are but few, and consequently positive lubrication is gaining ground. Cooling is largely done by thermo-syphon systems which have proved to come up to the requirements of this size of vehicle. Carburetion and ignition are by apparatus of standard design throughout, and the tubular type of radiator prevails, especially on the higher priced models. The majority of clutches are of the disk type, with cones ranging second, and few multiple-disk designs scattered in the group. A good many planetary gearsets are used along with selective types, but the chain drive is used in four-fifths of the vehicles. The average tire size is 33 by 3.5 inches all around, with a tendency toward solid tires. The service brakes are in the wheel drums with few exceptions, and all the emergency brakes are there. The chassis frame is of pressed steel of various sections; wooden frames are dying out.

In this class the price has been cut very noticeably in many instances, but the average has hardly been reduced by half a century. As this trend necessitates efficient methods of manufacture in order to keep in the procession, its effect has been in the direction of eliminating the unfit and placing the freight automobile industry on a still stabler foundation.



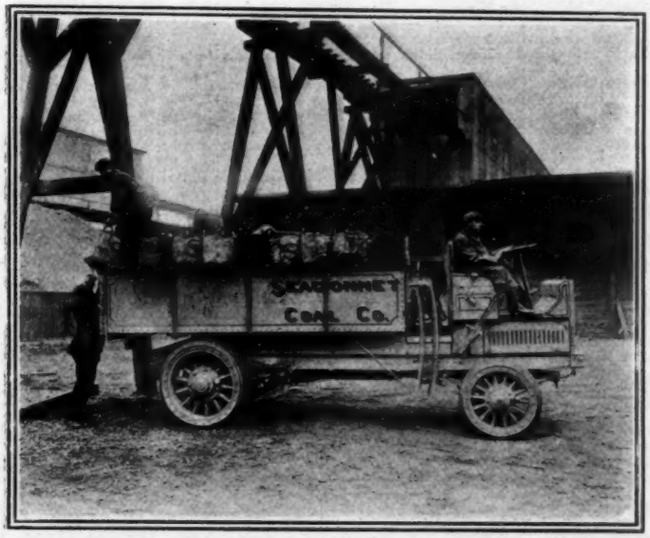
Oil tank of 1000 gallons capacity fitted to chain drive chassis

Developments in the trucks of more than 1 1-2 tons capacity have been principally of a mechanical nature, and by no means have they been limited to minor details and refinement. A comparison of the following short descriptions with those of the 1911 trucks will show a decided tendency toward the long stroke, especially among such heavy trucks as Alco, Hart-Kraft,

Review of Many Features That Are Now Used

Showing loaded Peerless truck with express body; note method of rolling up side-covers

Standardization and interchangeability have been taken up in truck manufacture and in a large number of cases the brakes have been enlarged to some extent. Worm drive while coming in has not as yet made much headway. Sleeve and other non-poppet forms of valves have not yet come into use.



Alco truck with body adapted to carry coal in bags

McIntyre and Kopp, as well as newcomers to the field like Lozier and Locomobile and importations and adaptations such as Gaggenau, De Dion, Commer and Saurer. The practice of casting cylinders in pairs is as strong as ever, although some prominent makes take an exceptional position. No attempt has been made to substitute air for water cooling, although, if air cooling is combined with a self-starting mechanism, the danger of the motor heating up while standing is eliminated, since it may be stopped and started without trouble. Most cooling systems comprise a pump, preferably of the centrifugal type, and a honeycomb radiator, although there are not a few of the tubular class. The multiple disk clutch with cork inserts has made good progress and the Hele-Shaw design is used on a number of trucks. Selective type transmissions are used almost exclusively, located amidship or, sometimes, unit with the jackshaft or power plant.. Four speeds and reverse are used on the heavy, high-class products, and accessibility of the transmission has been well cared for in these designs, both in case of the power plant and in that of the other working units. The final drive is by chains, double chains being used in many heavy trucks. Dead rear axles are found on many cars, and solid tires are used practically without exception. Frequently single sets of large rubber tires are used on front wheels, while the back wheels are shod with double tires of lesser diameter and section. Wooden wheels of the artillery type have hardly given way to mechanical designs which have not progressed very far. Nor has the use of rubber in solid tires been diminished by the growing practice of using steel-block tires on heavy trucks.

The brake arrangement has been standardized, inasmuch as nine-tenths of the service brakes act on the jackshaft and emergencies on the wheeldrum. Channel pressed steel is almost the universal material for chassis frames, and while some makers have introduced alloys in this material, the practice has not been followed generally. Weight reduction has been aimed at by the use of light metals for the lower crankcases, gearboxes and similar parts, while the strength of the working members has rather been increased than cut down. Worm and gear steering gears grow in number, and in transmissions there is a strong tendency toward such designs as thwart the probabilities of a driver's stripping the gears by keeping the latter in mesh when starting the car.

While few prices have been changed in this group of vehicles, the tendency seems to be a rising one, and newcomers desire to obtain a price somewhat above the present average established in their class by weight. In accordance with such conservative policies truck makers have stood back from introducing such radical departures as non-poppet valves or other mechanisms tending toward silent performance, since at this time their want is not being felt deeply.

Table of Specifications of Ameri

NAME AND MODEL	Body	Weight	Price	Load Platform in Feet	Total Length in Feet	Number Cylinders	Bore	Stroke	H.P., S.A.E.	Piston Displacement	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubrication
														Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
Acorn H	Optional	1000	.....	6.5x3.7	....	2	5.00	4.00	20.0	157.1	L.Head	Separate	Side	Ther	Tube	Single	.....	Hand	Scheb	Grav	Spl
Adams A	Optional	2000	$2100	8.6x3.8	15	4	3.87	5.00	24.0	235.8	L.Head	En bloc	Opp	Pump	Tube	Dual	Eisem	Hand	King	Grav	Spl
Alco 2-ton	Optional	4000	2950	Optional	14.8	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Hand	Newc	Grav	Spl
Alco 3½-ton	Optional	7000	3650	Optional	17.5	4	5.00	6.00	40.0	471.2	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Fixed	Newc	Grav	Spl
Alco 5-ton	Optional	10000	4750	Optional	19.5	4	5.00	6.00	40.0	471.2	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Fixed	Newc	Grav	Spl
Alco 6½-ton	Optional	13000	5500	Optional	19.5	4	5.00	6.00	40.0	471.2	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Fixed	Newc	Grav	Spl
Anglaize L	Express	700	800	5x3	10.3	2	5.00	4.00	20.0	157.1	L.Head	Sep'rate	Side	Ther	Cell	Dual	Split	Hand	Scheb	Grav	For
Anglaize B	Express	1000	1050	8x3.3	12.3	2	5.25	4.00	22.0	173.2	L.Head	Sep'rate	Side	Ther	Cell	Dual	Split	Hand	Scheb	Grav	For
Anglaize C	Express	1500	1475	8.6x3.6	13.3	4	3.75	4.50	22.5	198.8	L.Head	Pairs	Side	Ther	Cell	Double	Split	Hand	Scheb	Grav	For
Anna	Optional	.....	925–1050	.....	....	2	5.25	4.00	22.0	173.2	L.Head	Sep'rate	Side	Ther	Tube	Single	Bosch	Fixed	Scheb	Grav	For
Atlas L	Ex. or Pan.	1500	1750	7.5x3.6	13.3	2	4.50	4.50	....	143.1	2-Cycle	Pairs	.....	Pump	Cell	Single	.....	Hand	Own	Grav	I.Fl.
Atlas C	Ex. or Pan.	4000	2800	11x5.5	17.5	4	4.50	4.50	....	286.3	2-Cycle	Pairs	.....	Pump	Cell	Single	.....	Hand	Own	Grav	I.Fl.
Atterbury B	Optional	2000	.....	8x4	....	4	4.00	4.50	25.6	226.2	L.Head	En bloc	L.Si	Pump	Tube	Double	Bosch	Fixed	Scheb	Grav	For
Atterbury C	Optional	4000	.....	10x5	....	4	4.25	5.50	28.9	312.0	L.Head	En bloc	L.Si	Pump	Tube	Double	Bosch	Fixed	Scheb	Grav	For
Atterbury D	Optional	6000	.....	12x6	....	4	4.87	5.50	38.0	410.6	T.Head	Pairs	Opp	Pump	Tube	Double	Bosch	Fixed	Scheb	Grav	For
Autocar 21-C	Optional	3000	2150	.....	....	2	4.75	4.50	18.0	159.5	L.Head	Sep'rate	Side	Pump	Tube	Single	Bosch	Fixed	Strom	Grav	For
Avery 2-ton	Platform	4000	2500	10.3x4.3	18	4	4.75	5.00	36.1	354.4	L.Head	Sep'rate	Side	Pump	Opt	Dual	Eisem	Gor	Vort'x	Grav	For
Avery 3-ton	Platform	6000	3200	12.3x6.3	19.8	4	4.75	5.00	36.1	354.4	L.Head	Sep'rate	Side	Pump	Opt	Dual	Eisem	Gor	Vort'x	Grav	For
Babcock G	Optional	1400	2400	.....	....	2	5.25	4.00	22.0	173.2	.....	Sep'rate	.....	.....	Tube	Dual	Bosch	.....	Scheb	.....	For
Barker B	Ex. or Plat.	6000	3200	14x6	20.3	4	5.00	4.75	40.0	373.0	L.Head	Pairs	Side	Pump	Cell	Dual	Remy	Hand	Mayer	Grav	For
Barker B	Ex. or Plat.	10000	3700	14x6.5	20.3	4	5.00	4.75	40.0	373.0	L.Head	Pairs	Side	Pump	Cell	Dual	Remy	Hand	Mayer	Grav	For
Beck D-201	Optional	2000	1700	9x4.8	13.0	4	3.50	4.50	19.6	173.2	L.Head	Sep'rate	Side	Pump	Cell	Single	Remy	Hand	Scheb	Grav	Spl
Beck D-212	Optional	3000	2000	10x5	14.0	4	4.00	5.00	25.6	251.3	L.Head	Sep'rate	Side	Pump	Cell	Single	Remy	Hand	Scheb	Grav	Spl
Beck E-218	Optional	4000	2400	10x5	14.0	4	4.00	5.50	25.6	276.5	L.Head	Sep'rate	Side	Pump	Cell	Single	Remy	Hand	Scheb	Grav	Spl
Beck H-224	Bus	5000	3000	10.5x5.5	17.0	4	4.25	5.50	28.9	312.0	L.Head	Sep'rate	Side	Pump	Cell	Single	Remy	Hand	Scheb	Grav	Spl
Beck F-226	Optional	8000	2800	10x5	14.0	4	4.50	6.00	32.4	381.7	L.Head	Sep'rate	Side	Pump	Cell	Single	Remy	Hand	Scheb	Grav	Spl
Bergdoll C-30	Delivery	2600	1500	.....	....	4	4.00	4.50	25.6	226.2	.....	En bloc	.....	Pump	Cell	Dual	Bosch	Hand	Mayer	.....	Spl
Bessemer 10-B	Cov. or St.	1000	1000	7.5x3.5	....	3	4.00	4.00	....	150.8	2-Cycle	Sep'rate	.....	Ther	Cell	Single	Bosch	Hand	.....	Press	For
Bessemer A	Express	2000	1950	6.67x4	13.3	4	3.75	5.25	22.5	231.9	L.Head	En bloc	Side	Ther	Tube	Single	Bosch	Hand	Strom	Grav	For
Best 812	Open or Cl.	800	.....	5.3x3.4	9.7	2	4.50	4.50	16.2	143.2	L.Head	Sep'rate	Side	Ther	Tube	Single	.....	Gov	King	Grav	For
Blair 1½-ton	Express	3000	2750	11x5	16.0	4	4.13	5.00	27.2	267.3	L.Head	En bloc	Side	Pump	Tube	Dual	Bosch	Fixed	Strom	Grav	Spl
Blair 2½-ton	Stake	5000	3000	11.5x5.5	16.5	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Fixed	Strom	Grav	For
Blair 3½-ton	Stake	7000	3500	12.5x6	17.5	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Fixed	Strom	Grav	For
B.O.E. A-2	Optional	4000	2250	10x6	14.0	4	4.50	5.00	32.4	318.1	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Hand	Scheb	Grav	Spl
B.O.E. A-3	Optional	6000	3000	9x6	14.0	4	5.00	6.50	40.0	510.5	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Hand	Scheb	Grav	Spl
B.O.E. A-6	Optional	12000	6000	14x6	19.0	4	5.25	8.00	44.1	692.7	L.Head	Pairs	H&S	Ther	Tube	Double	Bosch	Hand	Scheb	Grav	For
Brush	Delivery	600	650	.....	....	1	4.00	5.00	6.4	62.8	L.Head	Sep'rate	Side	Ther	Tube	Single	.....	Hand	King	Grav	Spl
Buick	Express	2000	1000	7.48x5.5	....	2	4.50	5.00	16.2	159.0	L.Head	Sep'rate	H'd	Pump	Tube	Single	Remy	Hand	Scheb	Grav	For
Cameron	Delivery	.....	650	.....	....	4	3.87	3.75	24.0	176.9	I.Type	Sep'rate	H'd	Air	.....	Opt	.....	Hand	.....	Grav	For
Cameron	Ex. or Sta	.....	1400	.....	....	4	3.87	3.75	24.0	176.9	I.Type	Sep'rate	H'd	Air	.....	Opt	.....	Hand	.....	Grav	For
Cartercar T	Open	1500	1250	6.2x3.7	13.0	2	4.50	4.50	16.2	143.2	L.Head	Sep'rate	H&S	Ther	Tube	Dual	Remy	Hand	Scheb	Grav	For
Cartercar T	Panel	1500	1350	6.2x3.7	13.0	2	4.50	4.50	16.2	143.2	L.Head	Sep'rate	H&S	Ther	Tube	Dual	Remy	Hand	Scheb	Grav	For
Cass D	Optional	2000	1850	7.5–11x5	19*	4	4.00	4.50	25.6	226.2	L.Head	En bloc	Side	Ther	Cell	Opt	Bosch	Hand	King	Grav	Spl
Cass 2-ton	Optional	4000	2650	9–13x6	16.5–20.5	4	4.25	5.00	28.9	283.6	L.Head	Sep'rate	H&S	Pump	Cell	Opt	Bosch	Hand	King	Grav	Spl
Chase D	Ex. or Pan.	1500	900	5.8x3.7	12.0	3	4.13	4.00	....	160.4	2-Cycle	Sep'rate	.....	Air	.....	Single	Bosch	Fixed	Holl'y	Grav	I.Fl.
Chase K	Ex. or Pan.	2000	1400	6.8x3.7	13.0	3	4.13	4.00	....	160.4	2-Cycle	Sep'rate	.....	Air	.....	Single	Bosch	Fixed	Holl'y	Grav	I.Fl.
Chase L	Ex. or Pan.	3000	1750	7.8x4.2	15.0	3	4.50	5.00	....	238.6	2-Cycle	Sep'rate	.....	Air	.....	Single	Bosch	Fixed	Holl'y	Grav	I.Fl.
Chase J	Express	4000	2200	10x4.2	16.0	3	4.50	5.00	....	238.6	2-Cycle	Sep'rate	.....	Air	.....	Single	Bosch	Fixed	Holl'y	Grav	I.Fl.
Clark Pow.Wa'n, A	Express	2000	1600	8x3.7	....	2	5.00	5.50	20.0	215.9	L-Head	Sep'rate	Side	Ther	.....	Double	U&H	Fixed	Scheb	Grav	For
Coleman A-3	Optional	1200	1150	7x3.5	....	2	4.50	4.50	....	143.1	2-Cycle	Sep'rate	.....	Pump	Cell	Double	K-W	Hand	Stew	Grav	I.Fl.
Commer 4½-ton	Optional	9000	4500	12x6	19	4	4.31	5.50	31.0	321.3	L.Head	Pairs	L.Si	Ther	Tube	Double	Bosch	Hand	Claud	Grav	Spl
Commerce	Optional	1000	.....	.....	....	4	3.25	3.37	16.9	112.0	L.Head	Pairs	Side	Ther	Tube	.....	Bosch	Fixed	Scheb	Grav	Spl
Cortland	Optional	1500	1100	6.7x3.7	....	2	4.25	4.25	14.5	120.5	L.Head	Sep'rate	Side	Ther	Cell	.....	Remy	Hand	Scheb	Grav	For
Cortland	Optional	3000	1750	.....	11.5	2	5.25	5.50	22.0	238.1	L.Head	Sep'rate	Side	Pump	Cell	Dual	Remy	Hand	Scheb	Grav	For
Couple-Gear H-C	Optional	7000	4950	14x5.5	18.5	4	5.25	6.00	44.1	519.5	T.Head	Sep'rate	Opp	Pump	Tube	Dual	Bosch	Hand	Strom	Grav	Spl
Couple-Gear A-C	Optional	10000	5400	14x6	18.5	4	5.25	6.00	44.1	519.5	T.Head	Sep'rate	Opp	Pump	Tube	Dual	Bosch	Hand	Strom	Grav	Spl
Crawford 12-30	Delivery	1200	1350	.....	....	4	4.13	4.75	27.3	253.9	L.Head	En bloc	Side	Pump	Tube	Dual	Remy	Hand	Strom	Grav	Spl
Crown A	Optional	1500	1200	.....	13	4	3.75	4.50	22.5	198.8	T.Head	Sep'rate	Opp	Ther	Tube	Dual	Remy	Hand	Scheb	Grav	Spl

ABBREVIATIONS: Ex., express; Pan., panel; Plat., platform; Cov., covered; St., stake; L. Si., left side; Opp., opposite; H. & S., head and side; R. Si., right side; Ther., thermo-syphon water circulation; Cell., cellular; Tube., tubular; Opt., optional; Gov., governor; Grav., gravity; Spl., splash; For., forced; I. Fl., in fuel; Ell., elliptic; I-b'm., I beam; Rect., rectangular; Sq., square; M. Disc., multiple disc; S. & B., steel and bronze; S. & F., steel and fabric; Ray, raybestos;

can Commercial Vehicles for 1912

Wheelbase	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANK-SHAFT		BEARINGS				
	Front	Rear	Front	Rear		Type	Friction Surf.	Type	Number Sp.	Location				Service	Emergency	Type	Number	Gearset	Front Wheel	Rear Axle	Steer. Kn'kle	Steer. Gear
96	34x2½	36x2½	Ell....	Ell....	Tube..	.....	.....	Fric...	3	.....	Chain.	.....	Dead..	Int....	.....	Plain..	2	Plain..	Ball...	Ball...	Plain..	Plain
121	36x3	36x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	B.&P..	B.& P.
112	36x4	36x3	.....	.....	Rect..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	....	Ball...	Roller.	.....	.....	Plain
126	36x5	36x4	.....	.....	Rect..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	....	Ball...	Roller.	.....	.....	Plain
144-A	36x6	42x5	.....	.....	Rect..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	....	Ball...	Roller.	.....	.....	Ball
144-B	36x7	42x6	.....	.....	Rect..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	....	Ball...	Roller.	.....	.....	Plain
88	..x2	..x2	Ell....	Ell. ..	Solid..	M Disc.	Steel...	Plan..	2	Amid .	Chain.	R. R...	Dead..	.....	.....	Plain..	2	Plain..	Ball...	.....	Plain..	Ball
100	..x2	..x2	Ell....	Ell....	Solid..	M Disc.	Steel...	Plan..	2	Amid .	Chain.	R. R...	Dead..	.....	.....	Plain..	2	Plain..	Ball...	.....	Ball...	Ball
159	..x2½	..x3	Ell....	Ell....	Solid..	M.Disc.	Steel...	Plan..	2	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	2	Plain..	Ball...	.....	Plain..	Ball
100	34x3½	34x3½	½ Ell..	Ell....	I-b'm..	M.Disc.	S. & F..	Plan..	2	Amid..	Shaft..	R. R...	Dead..	Int....	.....	Plain..	2	.....	Roller.	Roller.	Roller.	Ball
102	32x4½	32x4½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Ray....	Select.	2	U. M..	Shaft..	Springs.	Float..	Trans.	.....	Roller.	3	Roller.	Roller.	Roller.	Plain..	Plain
144	34x4	34x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Ray....	Select.	3	U. M..	Shaft..	Springs.	Float..	Trans.	.....	Roller.	5	Roller.	Roller.	Roller.	Roller.	Plain
125	36x3½	36x4	½ Ell..	½ Ell..	I-b'm..	M Disc.	.....	Select.	3	U M..	Chain.	R R...	Dead..	Int....	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Plain
144	36x3½	36x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	U. M..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	Roller.	Roller.	Roller.	Ball...	Plain
154	36x4	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	Roller.	Roller.	Roller.	Ball...	Plain
97	34x3½	34x4	½ Ell..	Plat...	Tube..	M.Disc.	S. & I..	Prog..	3	Amid..	Shaft..	Springs.	Float..	Ext...	Int....	Ball...	2	Roller.	Roller.	Roller.	Plain..	Plain
140	..x4	..x3½	½ Ell..	½ Ell..	Spec..	M.Disc.	Steel...	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	5	Roller.	Roller.	Roller.	B.& P.	Plain
140	..x5	..x4	½ Ell..	½ Ell..	Spec..	M.Disc.	Steel...	Select.	3	Amid..	Chain.	R. R...	Dead..	Int.. .	Int.. .	Plain.	5	Roller.	Roller.	Roller.	B & P.	Plain
100	34x3	34x3	½ Ell..	½ Plat.	Spec..	M Disc.	.....	Select.	3	Amid .	Chain.	.....	Dead..	Int....	Int....	Plain..	....	Roller.	Ball...	Roller.	.....	Ball
150	..x3½	..x4	.....	.....	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	.....	.....	Plain..	3	Ball...	Ball...	Ball...	Ball...	Ball
150	..x4	..x5	.....	.....	I-b'm..	M Disc.	S & B.	Select.	3	Amid .	Chain.	.....	Dead..	.....	.....	Plain..	3	Ball...	Ball...	Ball...	Ball...	....
110	36x3	36x3	Plat...	Plat...	Solid..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	.....	Dead..	.....	....s..	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball.
110	36x3½	36x3½	Plat...	Plat...	Solid..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball
110	36x3½	36x4	Plat...	Plat...	Solid..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	5	Ball...	Ball. .	Ball...	Ball...	Ball
130	36x3½	36x4	.....	Plat...	Solid..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball
110	36x4	36x6	Plat...	Plat...	Solid..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball
115	34x3½	34x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	U. M..	Shaft..	.....	Float..	Ext...	Int....	Ball...	....	Ball...	Ball...	Ball...	Ball...	Ball
100	34x4	34x4	½ Ell..	½ Plat.	I-b'm..	Cone...	L. & C..	Select.	3	Amid..	Chain.	.....	Float..	.....	.....	Plain..	3	.....	B.& R.	B.&R.	B.&R.	B.&R
105	34x2½	34x3	½ Ell..	Plat...	I-b'm..	Cone...	Leath..	Select.	3	Jack..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	Ball...	Roller.	Roller.	Ball...	Ball
76	32x2	34x2	½ Ell..	Ell....	.....	.....	.....	Fric...	....	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	2	Roller.	Roller.	Roller.	Plain..	Plain
114	34x4	34x3	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	3	Amid..	Worm.	.....	Float..	Ext...	Ext...	Plain..	3	Ball...	Roller.	B.&R.	Roller.	Ball
121	34x4	36x3½	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	3	Amid..	Worm.	.....	Float..	Ext...	Ext...	Plain..	3	Ball...	Roller.	B.&R.	Roller.	Ball
121	36x5	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	3	Amid..	Worm.	.....	Float..	Ext...	Ext...	Plain..	3	Ball...	Roller.	B.&R.	Roller.	Ball
144	34x4	36x4½	½ Ell..	½ Ell..	Sq....	M.Disc.	.....	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Plain..	Plain
148	36x5	36x3½	.....	.....	Sq....	M Disc.	.....	Select.	3	Amid .	Chain.	R R...	Dead.	Ext...	Int ...	Plain..	3	Ball...	Ball...	Ball...	Plain..	Plain
154	36x6	40x6	½ Ell..	½ Ell..	Sq....	M.Disc.	Steel...	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	.....	Ball...	Plain..	Plain..	Plain
80	28x3	28x3	Coil...	Coil...	Wood.	M.Disc.	S. & B..	Plan..	2	Amid..	Chain.	R. R...	Dead..	Int....	.....	Plain..	2	B.&P..	Ball...	B.&R.	Plain..	Plain
92	32x4	32x4	½ Ell..	.....	I-b'm..	Cone...	.....	Plan..	....	Amid..	Chain.	.....	Dead..	Int....	.....	Plain..	2	Plain..	Roller.	Roller.	Plain..	Plain
104	32x3	32x3	½ Ell..	Ell. ..	Tube .	Cone...	Leath..	Select.	3	R. A..	Shaft..	T. T....	Float..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Plain..	Plain
108	36x2½	36x2½	Ell....	Ell....	Solid..	Cone...	Leath..	Select.	3	R. A..	Chain.	T. T....	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Plain..	Plain
98	34x2½	36x2½	½ Ell..	½ Ell..	Tube..	.....	.....	Fric...	Any	Amid..	Chain.	.....	Dead..	Int....	Trans.	Plain..	2	Ball...	Ball...	Ball...	Plain..	Plain
98	34x2½	36x2½	½ Ell..	½ Ell..	Tube..	.....	.....	Frict..	Any	Amid..	Chain.	.....	Dead..	Int....	Trans.	Plain..	2	Ball...	Ball...	Ball...	Plain..	Plain
116–142	34x3½	34x4	½ Ell..	Plat...	Rect..	Cone...	L. & I..	Select.	2	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	2	B.&R.	Roller.	Roller.	Plain..	Plain
124–134	34x3½	38x3½	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & R..	Select.	4	U. M..	Chain.	R. R...	Dead..	.....	Int....	Plain..	5	Ball...	Roller.	Roller.	Plain..	Plain
100	36x2	38x2	Ell....	Ell....	.....	.....	.....	Plan..	2	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	4	BP&R	Ball...	Ball...	Plain.	Plain
106	36x2	38x2½	Ell. ..	½ Plat.	.....	Cone...	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	4	BP&R	Ball...	Ball...	Plain..	Plain
112	36x3	38x3½	Ell....	½ Plat.	.....	Cone...	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	Trans.	Plain..	4	BP&R	Ball...	Ball...	Plain..	Plain
120	36x3½	38x4	Ell....	½ Plat.	.....	Cone...	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	Trans.	Plain..	4	BP&R	Ball...	Ball...	Plain..	Plain
102	36x2½	36x2½	.....	.....	Solid..	Cone...	.....	Select.	2	Amid..	Chain.	R. R...	Dead.	.....	.....	Plain.	2	Ball. .	Roller.	Roller.	Plain.	Plain
96	..x2½	..x2½	Ell. ..	Ell. ..	Sq....	M Disc.	Steel...	Select.	....	Amid .	Chain.	.....	Dead.	.....	.....	Plain.	....	Plain..	Ball...	Ball...	Plain..	Ball
144–156	35x5	35x5	½ Ell..	½ Ell..	I-b'm..	Cone...	S. & L..	Jaw....	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Ball...	3	Ball...	Ball...	Ball...	Plain..	.B&P.
96	32x3½	32x3½	½ Ell..	½ Ell..	Tube..	.....	.....	Prict..	....	.....	Chain.	.....	½ Floa.	Int....	Int....	.....	....	.....	.....	.....	.....	.....
88	..x2	..x2	.....	Plat...	Sq....	.....	.....	Plan..	2	Amid..	Chain.	.....	Dead..	.....	.....	Plain..	2	.....	Ball...	Ball...	Plain..	Ball
104	..x3	..x3½	.....	.....	.....	.....	.....	Plan..	....	Amid..	Chain.	.....	Dead..	.....	.....	Plain..	2	.....	Roller.	Roller.	Plain..	Plain
144	..x3½	..x3½	½ Ell..	½ Ell..	.....	.....	.....	.....	....	.....	Elect..	.....	.....	.....	Elect..	.....	5	.....	Roller.	Roller.	Plain..	Roller
144	..x4	..x4	½ Ell..	½ Ell..	.....	.....	.....	.....	....	.....	Elect..	.....	.....	.....	Elect..	Plain..	5	.....	Roller.	Roller.	Plain.	Roller
115	34x3½	34x4	½ Ell..	Ell. ..	I-b'm	Cone...	Leath..	Select.	3	R A..	Shaft..	T. T....	Float..	Ext...	Int	Plain.	3	B & R	Ball. .	Roller.	Plain.	Plain
104	36x2½	36x3	½ Ell..	Ell. ..	Sq....	M Disc.	Steel...	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Ext...	Plain..	3	Ball...	Ball...	Ball...	Ball...	Ball

S. & I., steel and iron; L. & C., leather and cork; L. & I., leather and iron; S. & R., steel and raybestos; I. & C., iron and cork; S. & L., steel and leather; Fric., friction; Plan., planetary; Prog., progressive; Amid., amidship; U, unit; Jack, jackshaft; R. A., rear axle; R. R. radius rod; T. T., torsion tube; Int., internal; Ext., external; B. & R., ball and roller; B. P. & R., ball, plain and roller; B. & P., ball and plain. * Maximum.

Table of Specifications of American Commercial

NAME AND MODEL	Body	Weight	Price	Load Platform in Feet	Total Length in Feet	Number Cylinders	Bore	Stroke	H.P., S.A.E.	Piston Displacement	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubrication
														Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
Dart E-E	Open	1500	$650			2	4.25	5.00	14.5	141.8		Sep'rate		Ther.	Cell.		Split.		Scheb.	Grav.	For.
Day Utility B	Delivery	1000	1150	8x3		4	4.00	4.5	25.6	226.2	L.Head	Pairs	Side	Pump.	Tube.	Double.	Bosch.	Hand.	Scheb.	Grav.	Spl.
Denniston	Optional	1500	2000	8.3x4	11.5	2	4.00	4.75	12.8	119.4	L.Head	En bloc	Side	Pump.			Bosch.		King.		
Detroit M. Wagon A	Optional	800	610	5.5x3.7	11.0	2	4.00	4.00		100.5	2-Cycle	Sep'rate		Ther.		Single.	Bosch.	Fixed.	Holl'y.	Grav.	For.
Dispatch I	Open or Cl.	600	700	4x3	12.0	2	3.50	5.00		96.2	2-Cycle	Sep'rate		Air		Single.	Simms	Hand.	Scheb.	Grav.	I.Fl.
Dispatch Express	Open or Cl.	1000	900	7x3	14.5	4	3.50	5.00		192.4	2-Cycle	Sep'rate		Air		Single.	Simms	Hand.	Scheb.	Grav.	I.Fl.
Dorris G	Express	1500	2400	5.8x3.8		4	4.30	5.00	30.6	300.7	I.Type	Pairs	H'd.	Pump.	Cell.	Dual	Bosch.	Hand.	Strom.	Grav.	Spl.
Dorris G	Stake	3000		9.5x5.7	17	4	4.30	5.00	30.6	300.7	I.Type	Pairs	H'd.	Pump.	Cell.	Dual	Bosch.	Hand.	Strom.	Grav.	Spl.
Durable Dayton H.	St. or Exp.	4000	2500	11x4.5	16.5	4	4.50	5.00	32.4	318.1	T.Head	Pairs	Opp.	Pump.	Tube.	Double.	Bosch.	Hand.	Strom.	Grav.	For.
Durable Dayton K.	St. or Exp.	6000	3500	12.5x6	17.5	4	4.75	5.50	36.1	389.9	T.Head	Pairs	Opp.	Pump.	Tube.	Double.	Bosch.	Hand.	Strom.	Grav.	For.
Durable Dayton M.	St. or Exp.	10000	4500	13.5x5.6		4	5.25	7.00	44.1	606.1	T.Head	Pairs	Opp.	Pump.	Tube.	Double.		Hand.	Strom.	Grav.	Spl.
Duryea	Delivery		550			2	3.75	3.75		82.8	2-Cycle	Sep'rate		Air		Single.		Hand.	Heitg.	Grav.	I.Fl.
Evans I	Closed	1500	1200	4.7x3.7	12.3	4	4.00	4.00	25.6	201.1	L.Head	Pairs	L.Si.	Ther.	Tube.	Single.	Bosch.	Hand.	Scheb.	Grav.	Spl.
Federal C	Optional	2000	1800	8.5x5.2	15.3	4	4.25	4.50	28.9	255.3	L.Head	Pairs	R.Si.	Pump.	Tube.	Single.	Bosch.	Fixed.	Strom.	Grav.	Spl.
Federal D	Optional	2000	1800	12x5.2	18.5	4	4.25	4.50	28.9	255.3	L.Head	Pairs	R.Si.	Pump.	Tube.	Single.	Bosch.	Fixed.	Strom.	Grav.	Spl.
Ford	Delivery		700			4	3.75	4.00	22.5	176.7	L.Head	En bloc	R.Si.	Ther.	Tube.	Single.	Own.	Hand.	Opt.	Grav.	Spl.
Franklin L-5	Express	2000	2500	8x3.5	12.5	4	3.38	4.00	18.3	143.1	I.Type	Sep'rate	H'd.	Air		Single.	Bosch.	Fixed.	Own.	Grav.	For.
Franklin L-5	Platform	2000	2400	8x5	12.5	4	3.38	4.00	18.3	143.1	I.Type	Sep'rate	H'd.	Air		Single.	Bosch.	Fixed.	Own.	Grav.	For.
Franklin, K-6	Taxicab	5-pass	2850		12.0	4	3.38	4.00	18.3	143.1	I.Type	Sep'rate	H'd.	Air		Single.	Bosch.	Fixed.	Own.	Grav.	For.
Franklin O-1	Delivery	1000	2350	6x3.3	14.5	4	4.00	4.00	25.6	201.1	I.Type	Sep'rate	H'd.	Air		Single.	Bosch.	Fixed.	Own.	Grav.	For.
Frontenac	Optional	6000	3500		17.2	4	5.00	5.75	40.0	451.6	L.Head	Pairs	L.Si.	Pump.	Cell.	Dual	Opt.	Opt.	Strom.	Grav.	For.
Frontenac F	Optional	8000	3650		17.2	4	5.00	5.75	40.0	451.6	L.Head	Pairs	L.Si.	Pump.	Cell.	Dual	Opt.	Opt.	Strom.	Grav.	For.
F-S	Closed	800	600			1					L.Head		Side	Ther.	Cell.	Single.				Grav.	Spl.
F-S	Express	1500	1000	5x3.3		4	4.38	4.75	30.7	285.6	L.Head	Pairs	L.Si.	Pump.	Tube.	Dual	Remy.	Hand.	Strom.	Grav.	Spl.
F-S	Platform	7000	3500	12x6		4	4.75	5.25	36.1	372.1	L.Head	Pairs	L.Si.	Pump.	Tube.	Dual		Hand.	Strom.	Grav.	Spl.
*Garford D	Platform	10000		12.2x5.6	16.9	4	4.25	5.25	28.9	297.8	L.Head	En bloc	L.Si.	Pump.		Dual		Hand.	Own.	Grav.	Spl.
Geneva B	Express	1200	1300	6.5x3.5	11.5	2	5.13	4.25	21.0	185.6	L.Head	Sep'rate	Side	Pump.	Tube.	Single.	Opt.	Fixed.	Scheb.	Grav.	For.
Geneva C	Panel	1000	1350	6x3.5	11.0	2	5.13	4.50	21.0	185.6	L.Head	Sep'rate	Side	Pump.	Tube.	Single.	Opt.	Fixed.	Scheb.	Grav.	For.
Glide	Open & Cl.	1500	2000			4	4.75	5.00	63.1	354.4	L.Head	Sep'rate	R.Si.	Pump.	Cell.	Dual	Eisem.	Hand.	Scheb.	Grav.	Spl.
G-M-C V	Optional	2000	2300	8x4.7	15.8	4	3.50	5.25	19.6	202.0	L.Head	En bloc	R.Si.	Pump.	Tub.	Dual	Bosch.	Gov.	Opt.	Grav.	For.
G-M-C S	Optional	4000	2750	11x5.3	19.4	4	4.00	6.00	25.6	301.6	L.Head	En bloc	R.Si.	Pump.	Tube.	Dual	Bosch.	Gov.	Opt.	Grav.	For.
G-M-C H	Optional	7000	3500	14x5.3	18.3	4	5.00	5.00	40.0	392.7	L.Head	Pairs	L.Si.	Pump.	Cell.	Double.	Mea.	Gov.	Scheb.	Grav.	Spl.
G-M-C K	Optional	10000	4400	14.2x5.3	18.3	4	5.00	5.00	40.0	392.7	L.Head	Pairs	L.Si.	Pump.	Cell.	Double.	Mea.	Gov.	Scheb.	Grav.	Spl.
Grabowsky 1-ton	Optional	2000		8x4		4	4.25	4.50	28.9	255.3	L.Head	Pairs	R.Si.	Pump.	Cell.	Dual	Bosch.	Gov.		Grav.	Spl.
Grabowsky 2-ton	Optional	4000		11x5.5		4	4.25	4.50	28.9	255.3	L.Head	Pairs	R.Si.	Pump.	Cell.	Dual	Bosch.	Gov.		Grav.	Spl.
Grabowsky 3-ton	Optional	6000		12x6		4	5.00	5.00	40.0	392.7	L.Head	Pairs	L.Si.	Pump.	Cell.	Dual	Bosch.	Gov.		Grav.	Spl.
Grabowsky 5-ton	Optional	10000		14x6		4	5.25	5.75	44.1	497.8	T.Head	Pairs	Opp.	Pump.	Cell.	Dual	Bosch.	Gov.		Grav.	Spl.
Gramm 1-ton	Optional	2000	2000	9.4x4	13.5	4	4.00	5.00	25.6	251.3	L.Head	En bloc	R.Si.	Ther.	Tube.	Single.	Bosch.	Fixed.	Rayf.	Grav.	For.
Gramm 2	Optional	4000	2600	11x4.5	14.9	4	4.25	4.50	28.9	255.3	L.Head	Pairs	R.Si.	Pump.	Tube.	Single.	Bosch.	Fixed.	Rayf.	Grav.	For.
Gramm 3	Optional	6000	3600	12.5x6	17.1	4	5.00	5.00	40.0	392.7	L.Head	Pairs	R.Si.	Pump.	Tube.	Dual	Opt.	Hand.	Rayf.	Grav.	For.
Gramm 5	Optional	10000	4500	13x6	17.1	4	5.00	4.00	40.0	392.7	L.Head	Pairs	R.Si.	Pump.	Tube.	Dual	Opt.	Hand.	Rayf.	Grav.	For.
Great Eagle 4-50	Ambul.		3500			4	4.75	5.00	36.1	354.4	L.Head	Sep'rate	L.Si.	Pump.	Cell.	Dual	Remy.		Strom.		
Hart-Kraft B	Delivery	1000	1175	5.5x4		2	4.50	4.00	16.2	127.3	L.Head	Sep'rate	Side	Ther.	Tube.	Dual	Opt.	Hand.	Scheb.	Grav.	Spl.
Hart-Kraft Bx	Delivery	1500	1250	6.3x4		2	4.50	4.00	16.2	127.3	L.Head	Sep'rate	Side	Ther.	Tube.	Dual	Opt.	Hand.	Scheb.	Grav.	Spl.
Hart-Kraft E	Optional	2000	2000	7.2x3.5	14.5	4	4.13	5.25	27.2	280.6	L.Head	En bloc	Side	Pump.	Tube.	Dual	Opt.	Hand.	Scheb.	Grav.	For.
Hart-Kraft C	Optional	3000	2500	7.9x3.5	15.5	4	4.13	5.25	27.3	231.9	L.Head	En bloc	Side	Pump.	Tube.	Dual	Opt.	Hand.	Scheb.	Grav.	For.
Hart-Kraft D	Optional	5000	3000	10x5	18.0	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump.	Tube.	Dual	Opt.		Scheb.	Grav.	For.
Hart-Kraft G	Optional		1800			4	3.75	5.25	22.5	242.9	L.Head	En bloc	Side	Pump.	Tube.	Dual	Opt.		Scheb.	Grav.	For.
Hart-Kraft H	Optional		2750			4	4.13	5.25	27.3	280.6	L.Head	En bloc	Side	Pump.	Tube.	Dual	Opt.		Scheb.	Grav.	For.
Hart-Kraft F	Optional		3400			4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump.	Tube.	Dual	Opt.		Scheb.	Grav.	For.
Hatfield G	Optional	1000	850	6x3.6	10.5	3	4.13	4.00		160.5	2-Cycle	Sep'rate		Air		Single.	Bosch.	Fixed.	Holl'y.	Grav.	I.Fl.
Hatfield H	Optional	2000	1200	7x4	11.5	3	4.13	4.00		160.5	2-Cycle	Sep'rate		Air		Single.	Bosch.	Fixed.	Holl'y.	Grav.	I.Fl.
Herreshoff	Delivery		950			4	3.38	3.75	18.3	134.2	L.Head	En bloc	L.Si.	Ther.	Tube.	Single.	Opt.	Fixed.	Strom.	Grav.	Spl.
Hewitt 1-ton	Optional	2000	1800																		
Hewitt 1½-ton	Optional	3000	2100																		
Hupmobile	Delivery		850			4	3.25	3.38	16.9	112.0	L.Head	Pairs	L.Si.	Ther.	Tube.	Single.	Bosch.	Fixed.	Breeze	Grav.	Spl.
Ideal H	Express	1500	1500	8.5x3.6	13.8	4	3.50	4.25	19.6	163.5	L.Head	Pairs	L.Si.	Ther.	Tube.	Single.	Bosch.	Hand.	Opt.	Grav.	For.
Ideal I	Ex. or St.	2000	1750	9x3.6	14.3	4	3.50	4.25	19.6	163.5	L.Head	Pairs	L.Si.	Ther.	Tube.	Dual	Bosch.	Hand.	Opt.	Grav.	For.
Ideal G	Platform	2000	2200	10x5.3	15.3	4	4.13	5.25	27.3	280.6	L.Head	En bloc	L.Si.	Pump.	Tube.	Double.	Bosch.	Hand.	Opt.	Grav.	For.
Indiana A	Ex. or St.	3000	2000	9.5x5	16.0	4	4.00	4.00	35.6	201.1	L.Head	Sep'rate	Side	Pump.	Tube.	Single.	Bosch.	Fixed.		Grav.	Spl.
International G	Delivery	1000				2	5.00	5.00	20.0	196.3	I.Type	Sep'rate	H'd.	Air		Dual	Bosch.	Hand.	Scheb.	Grav.	For.
Jackson 36	Panel top	1200	1200	5.5x3.5	15.0	4	4.25	4.50	28.9	255.3	I.Type	Pairs	Side	Ther.	Cell.	Dual	Split.	Hand.	Scheb.	Grav.	Spl.
Johnson A	Ex. or St.	2000	2000	9.4x4	13.8	4	4.25	4.50	28.9	255.3	I.Type	Pairs	Side	Pump.	Cell.	Dual	Bosch.	Gov.	Strom.	Grav.	For.

ABBREVIATIONS: Ex., express; Pan., panel; Plat., platform; Cov., covered; St., stake; L. Si., left side; Opp., opposite; H. & S., head and side; R. Si., right side; Ther., thermo-syphon water circulation; Cell., cellular; Tube., tubular; Opt., optional; Gov., governor; Grav., gravity; Spl., splash; For., forced; I. Fl., in fuel; Ell., elliptic; I-b'm., I beam; Rect., rectangular; Sq., square; M. Disc., multiple disc; S. & B., steel and bronze; S. & F., steel and fabric; Ray, raybestos;

Vehicles for the Present Year—Continued

Wheelbase	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANK-SHAFT		BEARINGS				
	Front	Rear	Front	Rear		Type	Friction Surf.	Type	Number Sp.	Location				Service	Emergency	Type	Number	Gearset	Front Wheel	Rear Axle	Steer. Kn'kle	Steer. Gear
80	36x..	36x..	Ell....	Ell....	.....	Cone...	.....	Plan..	2	.....	Chain.	.....	Dead..	Ext...	Ext...	Plain.	....	Plain..	Ball...	Ball...	Ball...	Plain
110	32x3½	32x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	U. M..	Shaft..	Springs.	Semi-f	I. & E.	I. & E.	Plain..	3	Plain..	Ball...	Roller.	Ball...	Ball
94	Opt..	Opt..	½ Ell..	½ Ell..	.....	.....	.....	.....	3	.....	.....	.....	.....	Trans.	Int....	Plain..	2	Ball...	.....	.....	.....	.....
100	32x2	32x2½	½ Ell..	Ell....	Tube..	M.Disc.	S. & F..	Plan..	2	Jack..	Chain.	.....	Dead..	.....	.....	Plain..	2	.....	Ball...	Roller.	Ball...	.....
96	36x3	36x3	Ell....	Ell....	Tube..	M.Disc.	P. & I..	Frict..	Any	Amid..	Chain.	RR&S..	Dead..	Int....	Trans.	Plain..	3	Roller.	Roller.	Roller.	Plain..	Ball
120	36x3½	36x3½	Ell. ..	Ell....	Tube..	M.Disc.	F & I..	Frict..	Any	Amid .	Chain.	RR&S .	Dead.	Int ...	Trans.	Plain.	5	Roller.	Roller.	Roller.	Plain.	Ball
132	34x4	34x4	½ Ell..	Plat...	I-b'm .	M.Disc.	Ray....	Select	3	U. M..	Shaft..	TT&S..	Float..	Int....	Ext...	Plain..	3	Roller.	Roller.	Roller.	Plain..	Ball
138	34x3½	36x3	½ Ell..	½ Ell..	I-b'm..	M.Disc.	R.& S..	Select.	3	U. M..	Chain.	R. R....	.....	Ext...	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball
120	36x4	36x4	½ Ell..	Plat...	I-b'm	M Disc.	S. & B..	Select.	3	.....	Chain.	.....	Dead..	Trans.	.....	Plain..	3	.....	Roller.	.....	Roller.	Ball
136	36x5	36x4	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & B..	Select.	3	Jack..	Chain.	.....	Dead..	Ext...	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball
150	36x5	42x5	.....	.....	I-b'm..	M.Disc.	S. & B..	Select.	3	.....	Chain.	.....	Dead..	Jack..	.....	Plain..	3	.....	Roller.	.....	Roller.	Ball
84	38x1½	42x1½	½ Ell..	½ Ell..	Chan..	.....	Steel...	.....	2	R. A..	Roller.	T. R ..	Dead.	.....	.....	Plain..	4	Roller.	Ball...	Ball...	Plain.	Plain
112	33x4	33x4	½ Ell..	½ Ell..	I-b'm	Cone...	S. & B..	Select.	3	Amid..	Shaft..	T. T....	S.-F...	I. & E.	.....	Plain..	2	Plain..	Ball...	Ball...	Plain..	Plain
110	36x3½	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	U. M..	Chain.	R. R....	Dead.	Int ...	Int ...	Plain..	3	Roller.	Roller.	Roller.	Plain..	Plain
144	36x3½	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	U. M..	Chain.	R. R....	Dead..	Int....	Int....	Plain..	3	Roller.	Roller.	Roller.	Plain..	Plain
100	30x3	30x3½	.....	.....	I-b'm..	M.Disc.	.....	Plan..	2	U. M..	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	.....
94	36x5½	36x5½	Ell....	½ Ell..	Tube..	M.Disc.	S. & B..	Prog..	3	Amid..	Shaft..	Springs.	S.-F...	Trans.	.....	Plain..	5	Ball...	Roller.	Ball...	Plain..	B.&P.
94	36x5½	36x5½	Ell. ..	½ Ell..	Tube..	M.Disc.	S. & B..	Prog..	3	Amid..	Shaft..	Springs.	S.-F...	Ext...	Ext...	Plain.	5	Ball...	Roller.	Ball...	Plain..	B &P.
100	30x4	30x4	Ell....	Ell....	Tube..	M.Disc.	S. & B.	Select.	3	Amid..	Shaft..	Springs.	S.-F...	Ext...	Ext...	Plain.	5	Ball...	Roller.	Ball...	Plain..	B.&P.
122	36x4½	36x4½	Ell....	Ell....	Tube..	M.Disc.	S. & B..	Select.	3	Amid..	Shaft..	Springs.	S.-F...	Ext...	Ext...	Plain.	5	Ball...	Roller.	Ball...	Plain..	B.&P.
118	36x4	36x3	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	3	Amid..	Chain.	R. R....	Dead.	Ext...	Int....	Plain.	3	Roller.	Roller.	Roller.	Roller.	Plain
118	36x5	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	3	Amid..	Chain.	R. R....	Dead..	Ext...	Int....	Plain.	3	Roller.	Roller.	Roller.	Roller.	Plain
90	32x1½	32x1½	½ Ell..	Ell....	I-b'm.	M. Disc.	R. & S..	Prog..	2	U. M...	Shaft..	T. T....	S.-F...	Int....	Int....	Plain..	2	Plain..	Ball...	Roller.	Plain..	Plain
115	34x3½	34x3½	½ Ell..	½ Ell..	Tube..	.....	.....	Frict..	Any	Amid..	Chain.	R. R....	Dead..	Ext...	Ext...	Plain..	3	Plain..	Ball...	Ball...	Plain..	Plain
120	36x5	36x4	½ Ell..	½ Ell..	.....	M.Disc.	Steel...	Select.	4	U. M..	Chain.	R. R....	Dead..	Ext...	Int....	Plain..	3	P&BR	Ball...	Ball...	Plain..	Plain
120	36x6	40x6	½ Ell..	½ Ell..	Rect..	Cone...	L. & C..	Select.	4	Amid .	Chain.	T. R ..	Dead.	Ext...	Int ...	Plain.	3	Ball...	Roller.	Roller.	Ball. .	Ball
96	34x2	36x2½	½ Ell..	Ell....	Solid..	M.Disc.	S. & L .	Plan..	2	Jack..	Chain.	.....	Dead.	Int....	.....	Plain	2	Ball...	Ball...	Ball...	Plain..	.....
96	34x2	36x2½	½ Ell..	Ell....	Solid..	M.Disc.	S. & L..	Plan..	2	Jack..	Chain.	.....	Dead..	Int....	.....	Plain..	2	Ball...	Ball...	Ball...	Plain..	.....
120	36x4½	40x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Select.	3	R. A..	Shaft..	T. T....	S.-F...	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	3&P..	Plain
126	34x3	36x4	½ Ell..	½ Ell..	I-b'm.	M.Disc.	S. & A.	Select.	4	U. M..	Chain.	R. R....	Dead.	Ext...	Int ...	Plain.	3	Ball. .	Roller.	Roller.	Roller.	Plain
142	34x4	34x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & A.	Select.	4	U. M..	Chain.	R. R....	Dead.	Ext...	Int ...	Plain.	3	Ball...	Roller.	Roller.	Roller.	Plain
138	36x5	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Prog..	3	U. M..	Chain.	R. R....	Dead..	Ext...	Ext...	Plain.	3	B&R..	Roller.	Roller	Roller.	Plain
138	36x6	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Prog..	3	U. M..	Chain.	R. R....	Dead.	Ext...	Ext...	Plain.	3	B&R..	Roller.	Roller.	Roller.	Plain
121	34x3½	34x4	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & R..	Select.	3	U. M..	Chain.	R. R....	Dead..	Ext..	.....	Plain..	3	Roller.	Roller.	Roller.	Plain..	Plain
145	36x4	36x3½	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & R..	Select.	3	U. M..	Chain.	R. R....	Dead..	Ext...	.....	Plain..	3	Roller.	Roller.	Roller.	Plain..	Plain
145	36x5	40x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & R..	Select.	3	U. M..	Chain.	R. R....	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Plain
156	38x6	42x6	½ Ell..	½ Ell..	I'-bm..	M.Disc.	S. & R..	Select.	3	U. M..	Chain.	R. R....	Dead.	Ext...	.....	Plain.	3	Roller.	Roller.	P&R .	Roller.	Plain
106	34x3½	34x3½	½ Ell..	½ Ell..	Sq....	M.Disc.	Steel...	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	2	Roller.	Roller.	Roller.	.....	.....
116½	36x4	36x3	½ Ell..	½ Ell..	Sq....	M.Disc.	Steel...	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	3	Roller.	Roller.	.....	.....	.....
124	36x5	36x4	½ Ell..	½ Ell..	Sq....	M.Disc.	Steel...	Select.	4	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain.	3	Roller.	Roller.	....	.....	.....
130	36x5	40x5	½ Ell..	½ Ell..	Sq....	M.Disc.	Steel...	Select.	4	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain.	3	Roller.	Roller.	.....	.....	.....
135	36x4½	36x4½	.....	.....	I-b'm.	Cone...	.....	Select.	3	Amid .	Shaft..	.....	Float..	Ext...	Int....	.....	....	.....	Roller.	Roller.	.....	.....
90	34x2½	34x2½	Ell. ..	Ell. ..	Rect..	M.Disc.	Steel...	Plan..	2	U M..	Chain.	.....	Dead.	Ext...	.....	Ball...	2	Roller.	Ball...	Ball. .	Plain.	Ball
95	34x3	34x3	Ell. ..	Ell....	Rect..	M.Disc.	Steel...	Plan..	2	U. M..	Chain.	.....	Dead.	Ext...	.....	Ball. .	2	Roller.	Ball. .	Ball. .	Plain..	Ball
120	34x3½	36x4	Ell....	Ell....	Plat...	Cone...	L. & I..	Select.	3	Amid .	Chain.	.....	Dead.	Ext..	Int ..	Plain.	3	Ball. .	Ball. .	Ball. .	Ball. .	Ball
127	34x3½	36x5	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Ball...	Ball
144	34x4	38x3½	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Ball...	Ball
116	34x	34x	Ell....	Ell....	.....	Cone...	Leath..	Select.	3	Amid .	Chain.	.....	.....	Ext...	Int....	Plain..	....	Ball...	Ball...	Ball...	.....	Ball
130	34x	36x	½ Ell..	½ Ell..	.....	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	.....	Ext...	Int....	Plain..	....	Ball...	Ball...	Ball...	.....	Ball
148	34x	38x	½ Ell..	½ Ell..	.....	M.Disc.	S. & B..	Select.	3	Amid .	Chain.	.....	.....	Ext...	Int....	Plain..	....	Ball...	Ball...	Ball...	.....	Ball
88	34x2	34x2	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R....	Dead..	Ext...	.....	Plain..	5	Roller.	Plain..	Roller.	.....	.....
96	34x2½	34x3	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R....	Dead..	Ext...	.....	Plain..	5	.....	Plain.	Roller.	.....	.....
100	32x3	32x3	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Select.	3	Amid..	Shaft..	.....	S.-F...	Ext...	Int....	Plain..	....	Plain..	Ball...	Roller	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
110	30x3	31x3½	½ Ell..	Plat...	I-b'm..	M.Disc.	Steel...	Select.	2	U. M..	Shaft..	T. T....	S.-F...	.....	.....	Plain..	3	Plain..	Roller.	Roller.	Roller.	Plain
106	36x2½	36x3	½ Ell..	½ Plat.	.....	Spec...	S. & T..	Select.	3	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	3	Ball...	Ball...	Ball...	Ball ..	Plain
115	36x3	36x3½	½ Ell..	½ Plat.	.....	Spec...	S. & T..	Select.	3	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
124	36x3½	36x4	½ Ell..	½ Plat.	.....	Cone...	Leath..	Select.	3	U. M..	Chain.	.....	Dead.	Int....	Int....	Plain..	3	Ball...	Ball...	.....	Ball...	Plain
120	34x3	34x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Select.	3	Jack..	Chain.	R. R....	Dead..	Trans.	.....	.....	.....	.....	Roller.	Roller.	Ball...	.....
84	..x1½	..x1½	Ell....	Ell....	Sq....	C. B....	Iron....	Clut'h.	2	Amid..	Chain.	R. R....	Dead..	Int....	Ext...	Plain..	2	Plain..	P&R..	P&R..	Plain..	Plain
115	33x4	33x4	Ell....	Ell....	I-b'm..	M.Disc.	Iron....	Select.	3	U. M..	Shaft..	R. R....	S.-F...	.....	.....	Plain..	3	Ball...	Ball...	B&R..	Plain .	Ball
100	34x3½	34x3½	½ Ell..	½ Ell..	I-b'm..	Cone...	S. & L..	Select.	3	Amid.	Chain.	R. R....	Dead.	Int...	Int....	Plain..	3	Ball...	Plain..	Plain..	Plain.	B&P.

S. & I., steel and iron; L. & C., leather and cork; L. & I., leather and iron; S. & R., steel and raybestos; I. & C., iron and cork; S. & L., steel and leather; Fric., friction; Plan., planetary; Prog., progressive; Amid., amidships; U., unit; Jack, jackshaft; R. A., rear axle; R. R., radius rod; T. T., torsion tube; Int., internal; Ext., external; B. & R., ball and roller; B. P. & R., ball, plain and roller; B. & P., ball and plain.

Table of Specifications of American Commercial

NAME AND MODEL	Body	Weight	Price	Load Platform in Feet	Total Length in Feet	Number Cylinders	Bore	Stroke	H.P., S.A.E.	Piston Displacement	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubrication
														Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
Johnson B	Ex. or St	4000	$2000	10.8x4.4	15.0	4	4.50	5.25	32.4	334.0	I.Type	Pairs	Side	Pump	Cell	Dual	Bosch	Gov	Strom.	Grav.	For.
Johnson C	Ex. or St	8000	3200	12.8x5.3	17.5	4	5.00	5.50	40.0	431.9	I.Type	Pairs	Side	Pump	Cell	Dual	Bosch	Gov	Strom.	Grav.	For.
Jonz B	Delivery		750			3	3.75	4.25		140.8	2-Cycle	Sep'rate		Ther.	Tube	Dual	Bosch	Hand.	Own.	Grav.	Spl.
Jonz B	Delivery	1000	800			3	3.75	4.25		140.8	2-Cycle	Sep'rate		Pump	Cell	Dual	Briggs	Hand.	Scheb.	Grav.	For
Jonz	Delivery	1000	1150			3	3.75	4.00		132.5	2-Cycle										
Jonz 3-ton	Optional	6000	3500			4	4.50	5.50	32.4	349.9	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Bosch	Hand.	Scheb.	Press.	Spl.
Juno E-2	Optional	4000	2650	11.5x5	16.0	4	4.25	5.00	82.9	283.6	T.Head	Pairs	Opp.	Pump	Tube	Dual	Opt	Hand.	Strom.	Grav.	For.
Juno F-3	Optional	6000	3250	13.5x5.5	18.0	4	4.75	5.50	36.1	389.9	T.Head	Pairs	Opp.	Pump	Tube	Dual	Opt	Hand.	Strom.	Grav.	For.
Kato H	Stake	6000	3500	12x6	15.5	4	4.75	5.00	36.1	354.4	L.Head	Pairs	Side	Pump	Tube	Single	Remy	Hand.	Scheb.	Grav.	Spl.
Kearns B	Express	1500	1075	6x3.5	10.5	3	4.00	4.00		150.8	2-Cycle	Sep'rate		Air		Single		Hand.	Scheb.	Grav.	I.Fl.
Kelsey L	Delivery	250				2	3.25	3.75		62.2	2-Cycle	Sep'rate		Ther.	Tube	Single			Own.	Grav.	I.Fl.
Kelsey N	Delivery	500				2	3.25	3.75		62.2	2-Cycle	Sep'rate		Ther.	Tube	Single			Own.	Grav.	I.Fl.
Kisselkar C	Optional	1500	1500	6.8x3.7	14.0	4	4.25	4.25	28.9	242.1	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Opt	Hand.	Strom.	Grav.	Spl.
Kisselkar E	Optional	2000	2250	8x5	15.0	4	4.50	4.75	32.4	302.2	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Opt	Hand.	Strom.	Grav.	Spl.
Kisselkar B	Express	4000	2900	10x5	18.0	4	4.50	4.75	32.4	302.2	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Bosch	Hand.	Strom.	Grav.	Spl.
Kisselkar A	Optional	6000	3350	12.4x6	19.4	4	4.88	5.00	38.0	373.3	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Bosch	Hand.	Strom.	Grav.	Spl.
Kisselkar 4-ton	Optional	8000	3650	14x6	21.0	4	4.88	5.00	38.0	373.3	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Opt	Hand.	Strom.	Grav.	Spl.
Kisselkar D	Optional	10000	4350	14x6.5	22.0	4	4.88	5.00	38.0	373.3	L.Head	Pairs	L.Si.	Pump	Cell	Dual	Opt	Hand.	Strom.	Grav.	Spl.
Klinekar 2-16	Optional	1250	1250			2								Ther.							For.
Kopp H	Platform	3000	2500			4	4.25	4.50	38.9	255.3	T.Head	Pairs	Opp.	Pump	Cell	Double	Bosch	Hand.	Opt	Grav.	For.
Kopp L	Optional	6000		11.5x6	16.0	4	4.88	5.50	38.0	410.6	T.Head	Pairs	Opp.	Pump	Cell	Double	Bosch	Hand.	Scheb.	Grav.	For.
Kopp M	Optional	10000		13.5x6	17.0	4	5.25	6.00	44.1	519.5	T Head	Sep'rate	Opp.	Pump	Cell	Double	Bosch	Hand.	Scheb.	Grav.	For.
Knox R-5	Platform	4000		10x5		4	5.00	4.75	40.0	373.0	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox R-7	Platform	4000		12x5		4	5.00	4.75	40.0	373.0	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox R-15	Optional	6000	3700	12x6		4	5.00	4.75	40.0	373.0	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox R-16	Optional	8000	4000	14x6		4	5.00	4.75	40.0	373.0	I-Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox M-17	Optional	10000	4500	14.5x6		4	5.50	5.50	48.4	522.7	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox M-18	Optional	12000	5000			4	5.50	5.50	48.4	522.7	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox R-64	Ambul		3900			4	5.00	4.75	40.0	373.0	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox M-3	Fire Comb.		5600			4	5.50	5.50	48.4	522.7	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox 8	Fire Comb.		9000			6	5.00	5.50	60.0	647.8	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox 9	Fire Comb.		11000			6	6.50	7.50	100.	1494	I Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Knox Martin	Tractor	16000	2750			4	5.00	4.88	40.0	382.9	I.Type	Sep'rate	H'd.	Pump	Tube	Double	Bosch	Hand.	Strom.	Grav.	For.
Lambert	Platform	1000	1175			2	5.25	4.00	22.0	173.1							Remy		Br'ze		Spl.
Lambert 1-ton	Ex. or Plat.	2000	1600	7.5x4	15.5	4	4.13	4.50	27.3	240.5	L.Head	En bloc	L.Si.	Pump	Tube	Dual	Remy	Hand.	Scheb.	Grav.	Spl.
Lambert 2-ton	Ex. or Plat.	4000	2000	9x5	19.5	4	4.13	4.50	27.3	240.5	L.Head	En bloc	L.Si.	Pump	Tube	Dual	Remy	Hand.	Scheb.	Grav.	Spl.
Lambert 3-ton	Platform	6000	3000			4	5.00	6.50	40.0	510.5		Pairs		Pump			Remy				Spl.
Landshaft A-B	Delivery	1000	950	7x3.5		2	5.00	4.75	20.0	186.5	L.Head	Sep'rate	Side	Ther.	Tube	Single		Hand.	Raym.	Grav.	For.
Landshaft C-I	Delivery	2000	1250-1300	8x3.5		2	5.00	5.00	20.0	196.3	L.Head	Sep'rate	Side	Ther.	Tube	Single		Hand.	Raym.	Grav.	For.
Lauth-Juergens G	Express	2000	1950	10x4	14.5	4	4.00	4.00	25.6	201.1	L.Head	Sep'rate	Side	Pump	Cell	Double	Bosch	Hand.	Rayf.	Grav.	Spl.
Lauth-Juergens F	Express	2000	1650	10x4	14.5	2	5.00	5.00	20.0	196.3	L.Head	Sep'rate	Side	Ther.	Cell	Dual	Bosch	Hand.	Scheb.	Grav.	For.
Lauth-Juergens H	Platform	4000	2700	13x5.5	16.9	4	4.50	5.00	32.4	318.1	L.Head	Sep'rate	Side	Pump	Cell	Double	Bosch	Hand.	Rayf.	Grav.	Spl.
Lauth-Juergens I	Platform	6000	3350	14x5.5	16.9	4	4.75	5.00	36.1	354.4	L.Head	Sep'rate	Side	Pump	Cell	Double	Opt	Hand.	Rayf.	Grav.	Spl.
LeMoon B	Express	2000	2000	8x4	16.5	4	4.00	4.00	35.6	201.1	L.Head	Sep'rate	Side	Pump	Tube	Single	Bosch	Fixed	Rayf.	Grav.	Spl.
LeMoon A	Express	3000	2500	10x4-5.5	17.5	4	4.50	5.00	32.4	318.1	L.Head	Sep'rate	Side	Pump	Tube	Single	Bosch	Hand.	Rayf.	Grav.	Spl.
Lincoln 27-29	Express	800	650-745	5.5x3.2	12.0	2	4.13	4.00	13.6	103.6	L.Head	En bloc	H&S.	Air		Single		Hand.	Scheb.	Grav.	For.
Lippard-StewartE-S	Ex. or Plat.	1500	1650	6.5x3.8	14.0	4	3.38	4.31	18.3	154.1	L.Head	En bloc	Side	Ther.	Cell	Single	Bosch	Fixed	Own.	Grav.	Spl.
Lippard-Stewart P	Panel	1500	1675	6.1x3.7	13.5	4	3.38	4.31	18.3	154.1	L.Head	En bloc	Side	Ther.	Cell	Single	Bosch	Fixed	Own.	Grav.	Spl.
Little Giant C	Optional	2000	1050	7.5x3.6		2	5.00	4.00	20.0	157.0	L.Head	Sep'rate	H&S.	Ther.	Tube	Single	Opt		Scheb.	Grav.	For.
Locomobile 5-ton	Optional	10000	4500			4	5.00	6.00	40.0	471.2	T.Head	Pairs	Opp.	Pump	Cell	Dual	Bosch	Fixed	Own.	Grav.	Spl.
Longest 3-A	Optional	8000	3500	12x6	22.0	4	5.00	5.50	40.0	431.9	T.Head	Pairs	Opp.	Pump	Tube	Double		Gov	Strom.	Grav.	Spl.
Lord BaltimoreA-12	Optional	6000	3250			4	4.13	5.25	27.3	280.6	L.Head	Pairs	L.Si.	Pump	Tube	Dual	Bosch	Hand.	Rayf.	Grav.	For.
Lozier 25	Optional	10000		12.6x6	18.5	4	4.25	6.50	28.9	368.8	L.Head	Pairs	L.Si.	Opt	Tube	Dual	Bosch	Gov		Grav.	Spl.
Mack 1-ton	Optional	2000	2500	Optional	17.8	4	4.50	5.50	32.4	349.9	L.Head	Pairs	R.Si.	Pump	Cell	Dual		Gov	Strom.	Grav.	Spl.
Mack 1½-ton	Optional	3000	2750	Optional	18.8	4	4.50	5.50	32.4	349.9	L.Head	Pairs	R.Si.	Pump	Cell	Dual		Gov	Strom.	Grav.	Spl.
Mack 2-ton	Optional	4000	3000	Optional	20.3	4	4.50	5.50	32.4	349.9	L.Head	Pairs	R.Si.	Pump	Cell	Dual		Gov	Strom.	Grav.	Spl.
Mack 3-ton	Optional	6000	4000	Optional	22 0	4	5.50	6.00	48.4	570.2	L.Head	Pairs	R.Si.	Pump	Cell	Opt	Bosch	Gov	Opt	Grav.	For.
Mack 4-ton	Optional	8000	4250	Optional	22.5	4	5.50	6.00	48.4	570.2	L.Head	Pairs	R.Si.	Pump	Cell	Opt	Bosch	Gov	Opt	Grav.	For.
Mack 5-ton	Optional	10000	4800	Optional	22.5	4	5.50	6.00	48.4	570.2	L.Head	Pairs	R.Si.	Pump	Cell	Opt	Bosch	Gov	Opt	Grav.	For.
Mack 7-ton	Optional	14000	5300	Optional	22.5	4	5.50	6.00	48.4	570.2	L.Head	Pairs	R.Si.	Pump	Cell	Opt	Bosch	Gov	Opt	Grav.	For.
Mais 1½-ton	Optional	3000	2750	Optional	Opt.	4	4.00	5.25	25.6	263.9	T.Head	Pairs	Opp.	Pump	Tube	Single	Eisem.	Gov	Rayf.	Grav.	Spl.
Mais 2½-ton	Optional	5000	3000	Optional	Opt.	4	4.00	5.25	25.6	263.9	T.Head	Pairs	Opp.	Pump	Tube	Single	Eisem.	Gov	Rayf.	Grav.	Spl.
Mais 5-ton	Optional	10000	4500	Optional	Opt.	4	4.38	6.50	30.6	390.9	T.Head	Pairs	Opp.	Pump	Tube	Single	Eisem.	Gov	Rayf.	Grav.	Spl.
Martin J	Delivery	1000	1400	5x3.3		2	4.50	4.50	16.2	143.1	L.Head	Sep'rate	H&S.								For.
Martin E-F-2	Del. or Ex.	1500	1450	6x3.5		2	4.50	5.00	16.2	159.1	L.Head	Sep'rate	H&S.								For.
Martin G-2—G-4	Del. or Ex.	1500	1600	6.5x3.5		2	4.50	5.00	16.2	159.1	L.Head	Sep'rate	H&S.								For.
Martin G3	Hearse	1500	1840	7.3x3.5		2	4.50	5.00	16.2	159.1	L.Head	Sep'rate	H&S.								For.
Martin H	Exp	2000	1750	7.3x6		2	4.50	5.50	16.2	174.9	L.Head	Sep'rate	H&S.								For.
Martin K2-K3	Express	4000	3000	9x4		4	4.25	5.00	28.9	283.6	L.Head	Pairs	Side								For.
Martin L	Platform	6000	3500	12x5		4	4.25	5.00	28.9	283.6	L.Head	Pairs	Side								For.
Maxine Tricar E	Pack. Van	5000	395		10.0	2	3.25	4.00	8.5	66.3	L.Head	Sep'rate	H&S.	Air			Split	Pixed	Own.		

ABBREVIATIONS: Ex., express; Pan., panel; Plat., platform; Cov., covered; St., stake; L. Si., left side; Opp., opposite; H. & S., head and side; R. Si., right side; Ther., thermo-syphon water circulation; Cell., cellular; Tube., tubular; Opt., optional; Gov., governor; Grav., gravity; Spl., splash; For., forced; I. Fl., in fuel; Ell., elliptic; I-b'm., I beam; Rect., rectangular; Sq., square; M. Disc., multiple disc; S. & B., steel and bronze; S. & F., steel and fabric; Ray, raybestos;

Vehicles for the Present Year—Continued

	TIRES		SPRINGS			CLUTCH		GEARSET						BRAKES		CRANK-SHAFT		BEARINGS				
Wheelbase	Front	Rear	Front	Rear	Front Axle	Type	Friction Surf.	Type	Number Sp.	Location	Drive	Car Drives Through	Rear Axle	Service	Emergency	Type	Number	Gearset	Front Wheel	Rear Axle	Steer. Kn'kle	Steer. Gear
108	36x4	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	Ball...	Plain..	Plain..	Plain..	B&P.
132	36x5	36x3½	½ Ell..	½ Ell..	R'nd..	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	Ball...	Plain..	Plain..	Plain..	B&P.
196	32x3½	32x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & R..	Select.	3	R. A..	Shaft..	T. T....	S.-F...	.....	.....	Plain..	4	Roller.	Ball...	Roller.	.....	.....
96	32x3½	32x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & R..	Select.	3	R. A..	Shaft..	T. T....	S.-F...	.....	.....	Plain..	4	Roller.	Ball...	Roller.	.....	.....
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
130	36x4	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	R. & S..	Select.	3	U. M..	Chain.	R. R...	Dead..	Int....	.....	Plain..	3	Roller.	Ball...	.....	Ball...	Ball
132	36x4	36x3	½ Ell..	Plat...	Sq....	M.Disc.	Steel...	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Ball...	Ball
143	36x5	36x4	½ Ell..	Plat...	Sq....	M.Disc.	Steel...	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	Ball...	Ball
120	34x5	34x5	½ Ell..	Plat...	.....	Cone...	L. & I..	Select.	3	Amid..	Shaft..	T. & R..	Float.	Int....	Int....	Plain..	3	Roller.	B&R..	B&R..	Plain..	Plain
100	34x2	34x2	Ell....	Ell....	Sq....	.....	.....	Frict..	Any	.....	Chain.	R. R...	Dead..	I. & E.	.....	Plain..	4	.....	Ball...	Ball...	Ball...	Ball
74	28x3	28x3	Ell....	Spec..	.....	.....	.....	Plan..	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
74	28x3	29x3½	Ell....	Spec..	.....	.....	.....	Plan..	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
120	35x4½	35x4½	.....	.....	I-b'm..	Cone...	Leath..	Select.	3	Amid..	Shaft..	Springs.	Float..	Ext...	.....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Plain
132	37x5	37x5	.....	.....	I-b'm..	Cone...	Leath..	Select	4	Amid..	Shaft..	Springs.	Float..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Plain
140	34x4	36x3½	½ Ell..	½ Ell..	I-b'm..	Cone...	Leath..	Select.	4	Amid..	Chain.	R. R...	Rect..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Worm.
144	36x4	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	Leath..	Select.	4	Amid..	Chain.	R. R...	Rect..	.....	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Worm.
156	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	Cone...	Leath..	Select.	4	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Plain
156	36x5	40x6	½ Ell..	½ Ell..	I-b'm..	Cone...	Leath..	Select.	4	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Plain
86	36x3	36x3	½ Ell..	Ell....	Sq....	.....	.....	Plan..	2	.....	Chain.	.....	Sq....	.....	.....	.....	3	.....	.....	.....	.....	.....
120	36x4	36x5	Ell....	Ell....	.....	M.Disc.	.....	Select.	3	Amid..	Chain.	.....	Dead..	Int....	Ext...	Plain..	....	Ball...	Roller.	Roller.	.....	Ball
116	36x5	36x4	.....	.....	I-b'm..	Cone...	.....	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball
126	36x6	36x5	.....	.....	I-b'm..	Cone...	.....	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	5	Roller.	Roller.	Roller.	Roller.	Ball
103	34x4	34x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Ball...	Roller.	Ball...	Roller.	B&P
125	34x4	34x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Ball...	Roller.	Roller.	Roller.	B&P
149	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	B&P
149	36x6	36x6	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	B&P
149	36x6	36x6	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	B&P
149	36x6	42x6	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	B&P
134½	38x5½	38x5½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	U. M..	Shaft..	T&RR.	Float.	Ext...	Ext...	Plain..	5	Ball...	Roller.	Ball...	Ball...	Ball
145	40x5½	40x5½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Ball...	Roller.	Roller.	Roller.	B&P
170	40x5	40x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	B&P
186	40x5	40x5	½ Ell..	½ Ell..	.....	M.Disc.	I. & C..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	B&P
.....	32x..	32x..	.....	.....	.....	M.Disc.	S. & B..	Select.	3	U. M..	Chain.	R. R...	Dead..	.....	.....	.....	.....	.....	.....	.....	.....	.....
100	38x2	38x2½	½ Ell..	½ Ell..	Tube..	.....	.....	Frict..	Any	.....	Chain	.....	Solid..	Ext...	Int....	Plain..	....	.....	Ball...	Ball...	.....	Plain
120	36x3	36x3½	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	.....	.....	.....	Dead..	Ext...	Int....	Ball...	2	Roller.	Roller.	.....	Ball...	Ball
138	36x3½	36x4	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	.....	.....	.....	Dead.	Ext...	Int....	Ball...	2	Roller.	Roller.	.....	Ball...	Ball
138	36x4	36x6	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	.....	.....	.....	Dead..	Ext...	Int....	Ball ...	....	.....	Roller.	B&R..	.....	Plain
86	34x2	36x2½	½ Ell..	Plat...	Sq....	M.Disc.	Steel...	Plan..	2	U.M...	Chain.	R. R...	Dead..	Int....	Int....	Plain..	2	B&R..	Ball...	Ball...	Plain..	Plain
96	34x2½	36x2½	½ Ell..	Plat...	Sq....	M.Disc.	Steel...	Plan..	2	U.M...	Chain.	R. R...	Dead..	Int....	Int....	Plain..	2	B&R..	Ball...	Ball...	Plain..	Plain
106	36x3½	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & F..	Select.	4	.....	Chain.	R. R...	Dead..	Trans.	Trans.	Plain..	5	Roller.	Ball...	Ball...	Ball...	Ball
105	32x3	32x3½	½ Ell..	Ell....	Sq....	M.Disc.	S. & F..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	3	Plain..	Ball...	Ball...	Ball...	Ball
120	36x4	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & F..	Select.	4	U. M...	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball
120	38x5	38x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & F.	Select.	4	U. M..	Chain.	R. R...	.....	Int....	Int....	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball
127	36x3	36x3½	.....	.....	I-b'm..	M.Disc.	.....	Select.	3	Jack..	Chain.	T. T....	Dead..	Trans.	.....	Plain..	5	Ball...	Ball...	Ball...	Plain..	Ball
132	36x3½	36x4	.....	.....	I-b'm..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	T. T....	Dead..	Trans.	.....	Plain..	5	Ball...	Ball...	Ball...	Ball...	Ball
87	34x3½	34x3½	Ell....	Ell....	Sq....	.....	.....	Frict..	Any	Amid..	Chain	Springs.	Dead..	.....	.....	Plain..	2	.....	.....	.....	Plain..	Plain
115	34x4	34x4	Ell....	½ Ell..	I-b'm..	M.Disc.	S. & R..	Select.	3	Amid..	Shaft..	T. R....	Float.	Ext...	Int....	Ball...	2	Ball...	Roller.	Roller.	Roller.	B&P
115	34x4	34x4	Ell....	½ Ell..	I-b'm..	M.Disc.	S. & R..	Select.	3	Amid..	Shaft..	T. R....	Float.	Ext...	Int....	Ball...	2	Ball...	Roller.	Roller.	Roller.	B&P
90	..x2½	..x2½	½ Ell..	Ell....	Solid..	M.Disc.	Steel...	Plan..	2	U. M..	Chain.	R. R...	Dead..	Int....	Ext...	Plain..	2	.....	Ball ..	Ball...	Plain..	Ball
140	40x6	40x6	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Select.	4	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Roller.	Roller.	Roller.	Roller.	Roller
Opt.....	..x4	..x4	.....	.....	Solid..	Cone...	Leath..	Select.	4	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Roller
114	34x4	36x6	.....	.....	Solid..	Cone...	.....	Select.	3	U. M..	Chain.	.....	Dead..	.....	.....	.....	....	Ball...	Ball...	Ball...	Ball...	Ball
134	36x5	40x5	½ Ell..	Plat...	I-b'm..	M.Disc.	Steel...	Select.	4	Amid..	Chain.	R. R...	.....	Ext...	Int....	Ball...	4	Ball...	Roller.	Roller.	Roller.	Ball
126–138	36x4	36x2½	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & B	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Ball
126–150	36x4½	36x3	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Ball
126–162	36x4	36x3½	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Ball
129–168	36x5	36x4	½ Ell..	Plat...	Sq....	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
129–174	36x6	36x4½	½ Ell..	Plat...	Sq....	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
129–174	36x6	36x5	½ Ell..	Plat...	Sq....	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
129–474	36x7	36x6	½ Ell..	Plat...	Sq....	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
119–132	36x3½	36x5	½ Ell..	½ Ell..	Tube..	Exp....	A. & I..	Prog..	3	U. M..	Shaft..	T. T....	Float.	Ext...	Int....	Ball...	3	Ball...	Roller.	B&R..	Roller.	Roller
132	36x4	36x6	½ Ell..	½ Ell..	Tube..	Exp....	A. & I..	Select.	3	U. M..	Shaft..	T. T....	Float.	Ext...	Ext...	Ball...	3	Ball...	Roller.	B&R..	Roller.	Roller
154	36x5	42x5	½ Ell..	½ Ell..	Tube..	Exp....	A. & I..	Select.	3	U. M..	Shaft..	T. T....	Float.	Ext...	Ext...	Ball...	3	Ball...	Roller.	B&R..	Roller.	Roller.
94	34x2½	34x2½	Ell....	Ell....	R'nd..	M.Disc.	.....	Plan..	2	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
94	36x2½	36x2½	Ell....	Ell....	R'nd..	M.Disc.	.....	Plan..	2	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
98	36x3	36x3	Ell....	Plat...	R'nd..	M.Disc.	.....	Plan..	2	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
104	36x3	36x3	Ell....	Plat...	R'nd..	M.Disc.	.....	Plan..	2	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
104	36x3½	36x3½	Ell....	Plat...	R'nd..	M.Disc.	.....	Plan..	2	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
138	36x4	40x5	½ Ell..	Plat...	R'nd..	M.Disc.	.....	Select.	3	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
138–154	36x4	40x3½	½ Ell..	Plat...	R'nd..	M.Disc.	.....	Select.	3	.....	.....	.....	R'nd.	.....	.....	.....	.....	.....	.....	.....	.....	.....
97	28x2½	28x2½	.....	½ Ell..	.....	.....	.....	.....	.....	.....	Chain.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

S. & L., steel and iron; L. & C., leather and cork; L. & L., leather and iron; S. & R., steel and raybestos; I. & C., iron and cork; S. & L., steel and leather; Fric., friction; Plan., planetary; Prog., progressive; Amid., amidships; U., unit; Jack, jackshaft; R. A., rear axle; R. R., radius rod; T. T., torsion tube; Int., internal; Ext., external; B. & R., ball and roller; B. P. & R., ball, plain and roller; B. & P., ball and plain.

Table of Specifications of American Commercial

NAME AND MODEL	Body	Weight	Price	Load Platform in Feet	Total Length in Feet	Number Cylinders	Bore	Stroke	H.P., S.A.E.	Piston Displacement	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubrication
														Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
McIntyre 2	Optional	800	$600	.....	....	2	4.13	3.75	13.6	100.2	L.Head	Sep'rate	H&S	Ther.	Tube.	Dual	.....	.....	.....	.....	Spl.
McIntyre 3	Optional	800	800	.....	....	4	3.50	3.38	19.6	129.9	L.Head	Sep'rate	H&S	Ther.	Tube.	Dual	Bosch	.....	.....	.....	Spl.
McIntyre 7	Optional	1500	950	.....	....	2	5.25	4.00	22.0	173.1	L.Head	Sep'rate	H&S	Ther.	Tube.	Dual	Remy	Gov.	Scheb.	Grav.	Spl.
McIntyre 8	Optional	1500	1200	.....	....	4	4.00	5.00	25.6	251.3	T.Head	Sep'rate	Opp.	Ther.	Tube.	Dual	Remy	Gov.	Scheb.	Grav.	Spl.
McIntyre 14	Optional	2000	1300	.....	....	2	5.25	4.75	22.0	205.6	T.Head	Sep'rate	H&S	Ther.	Tube.	Dual	.....	Gov.	Scheb.	Grav.	Spl.
McIntyre 15	Optional	2000	1450	.....	....	4	4.13	4.75	27.3	253.9	T.Head	Pairs	H&S	Ther.	Cell.	Dual	.....	Gov.	Scheb.	Grav.	Spl.
McIntyre 21	Optional	3000	1650	.....	....	4	4.13	4.75	27.3	253.9	T Head	Pairs	Side.	Pump	Cell.	Dual	Brig's.	.....	Scheb.	Grav.	Spl.
McIntyre 28	Optional	4000	2350	.....	....	4	4.13	5.25	27.3	280.6	L.Head	En bloc	Side.	Ther.	Tube.	Dual	.....	Gov.	Scheb.	Grav.	Spl.
McIntyre 35	Optional	6000	2850	.....	....	4	4.13	5.25	27.3	280.6	L.Head	En bloc.	Side.	Ther.	Tube.	Dual	.....	Gov.	Scheb.	Grav.	Spl.
Menominee	Optional	150	1200	6.5x3.5	13.6	4	3.75	4.50	22.5	319.0	L.Head	Pairs	Side.	Pump.	Tube.	Double.	Eisem.	Gov.	Scheb.	Grav.	Spl.
Mercury P1	Express	1000	750–850	7x3.5	9.0	2	4.25	4.00	14.5	113.4	L.Head	Sep'rate	H&S	Air	.....	Single	.....	Fixed.	Own.	Grav.	For.
Modern B	Express	1000	1200	9.1x4.1	15.0	4	3.75	4.50	22.5	198.8	L.Head	En bloc	Side.	Ther.	Tube	.....	Opt.	.....	.....	Grav.	Spl.
Modern A	Express	2000	1600	10x4.1	16.0	4	4.31	5.00	30.9	291.1	L.Head	En bloc.	Side.	Pump.	Cell.	Dual	Opt.	Hand.	Scheb.	Grav.	Spl.
Moeller C	Optional	6000	3500	12.5x6	16.9	4	4.50	5.00	32.4	318.1	L.Head	Sep'rate	L Si.	Pump.	Cell.	Dual	Bosch	Hand.	Strom.	Grav.	For.
Moeller A	Optional	10000	4500	12x6	16.0	4	4.50	5.00	32.4	318.1	L.Head	Sep'rate	L.Si.	Pump.	Cell.	Dual	Bosch	Hand.	Strom.	Grav.	For.
Moeller B	Optional	10000	4500	14x6	19.0	4	4.50	5.00	32.4	318.1	L.Head	Sep'rate	L.Si.	Pump.	Cell.	Dual	Bosch	Hand.	Strom.	Grav.	For.
Monitor A	Express	1500	1000	7.2x3.6	10.0	2	5.00	4.00	20.0	157.0	L.Head	Sep'rate	Side.	Ther.	Tube.	.....	Bosch	Gov.	Scheb.	Grav.	Spl.
Monitor B	Express	3000	1750	7x3.8	12.0	2	5.25	4.75	22.0	.....	L.Head	Sep'rate	Side.	Pump	Tube.	Dual	Bosch	Hand.	Scheb.	Grav.	For.
Moore A	Optional	2000	2100	10x6	14.3	4	4.13	5.25	27.3	280.6	L.Head	En bloc.	Side.	Pump.	Cell.	Dual	Bosch	Gov.	Scheb.	Grav.	Spl.
Moore B	Optional	4000	2600	13x6	17.3	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side.	Pump.	Cell.	Dual	Bosch	Gov.	Scheb.	Grav.	Spl.
Moore C	Optional	6000	3500	13x6.5	17.5	4	5	6	40.0	471.2	L.Head	Pairs	Side.	Pump.	Tube.	Dual	Bosch	Gov.	Scheb.	Grav.	Spl.
Mora 20	Ex. and St.	1500	1000	6.6x3.8	12.9	2	4.5	4.5	16.2	143.1	L.Head	Sep'rate	Side.	Ther.	Tube.	Dual	.....	Hand.	.....	Grav.	For.
Morgan C	Del. & St.	4000	3250	.....	....	4	4.13	5.12	27.3	274.0	.....	En bloc	.....	Pump.	Cell.	Dual	U&H.	Hand.	Mayer.	Grav.	Spl.
Morgan B	Del. & St.	6000	3750	.....	....	4	4.63	5.00	34.3	336.0	.....	En bloc	.....	Pump.	Cell.	Dual	U&H.	Hand.	Mayer.	Grav.	For.
Morgan A	Optional	10000	4750	14x6.1	18.6	4	5.00	5.00	40.0	392.7	I.Type	En bloc.	H'd.	Pump.	Cell.	Double.	U&H.	Hand.	Excel.	Grav.	For.
Natco 15	Optional	2000	.....	.....	14.0	4	3.50	5.00	19.6	192.4	L.Head	En bloc.	Side.	Ther.	Tube.	Single	.....	Fixed.	.....	Grav.	For.
Newark B	Express	1500	1800	6.5x3.7	14.0	4	3.56	4.75	21.2	189.4	T Head.	En bloc.	Opp.	Pump.	Cell.	Single	Bosch.	Fixed.	Opt.	Grav.	For.
Ohio M-N	Delivery	.....	2000	.....	....	4	4.50	4.75	32.4	302.2	T.Head	Pairs	Opp.	Pump.	Cell.	Dual	Split.	Hand.	Scheb.	Grav.	Spl.
Old Reliable	Optional	10000	4000	.....	....	4	4.75	5.50	36.1	389.9	T.Head	Pairs	Opp.	Pump.	Cell.	Double.	Bosch.	Hand.	Opt.	Grav.	Spl.
Oliver A	Optional	1500	.....	6.7x4	13.0	2	5.00	5.00	20.0	196.3	L.Head	Sep'rate.	Side.	Ther.	Tube.	Single	Mea.	Hand.	Strom.	Grav.	For.
Oliver B	Optional	3000	.....	Optional	17.1	2	5.00	5.00	20.0	196.3	L.Head	Sep'rate.	Side.	Ther.	Tube.	Single	Mea.	Hand.	Strom.	Grav.	For.
Packard 2-ton	Optional	4000	3000	10x5.6	....	4	4.06	5.13	27.1	265.7	T.Head	Pairs	Opp.	Pump.	Cell.	Dual	.....	Fixed.	Own.	Grav.	Spl.
Packard 3-ton	Optional	6000	3400	12x6	19.3	4	4.50	5.50	32.4	349.9	T.Head	Pairs	Opp.	Pump	Tube.	Dual	.....	Gov.	Own.	Grav.	Spl.
Packers D	Optional	4000	2500	10x5	17.2	4	4.25	4.50	28.9	255.3	T.Head	Pairs	Opp.	Pump.	Tube.	Dual	Split.	Hand.	Strom.	Grav.	Spl.
Packers E	Optional	7000	3400	12.5x5.5	....	4	5.25	6.00	44.1	519.5	T.Head	Sep'rate.	Opp.	Pump.	Tube.	Dual	Split.	Hand.	Strom.	Grav.	Spl.
Peerless T-C	Optional	10000	4300	12x6	21.5	4	4.50	6.50	32.4	413.5	T.Head	Pairs	Opp.	Pump	.....	Dual	Bosch	Hand.	Own.	Grav.	Spl.
Pierce-Arrow 5-ton	Optional	10000	4500	12.6x7	20	4	4.88	6.00	38.0	448.0	T.Head	Pairs	Opp.	Pump.	Tube.	Double.	Bosch.	Hand.	Own.	Grav.	For.
Plymouth D-3	Optional	2000	1800	.....	....	4	4.00	4.00	25.6	201.1	L.Head	Pairs	Side.	Pump.	Cell.	Dual	Split.	Hand.	Scheb.	Grav.	Spl.
Plymouth G-2	Optional	4000	2850	.....	....	4	5.00	6.00	40.0	471.2	L.Head	Pairs	Side.	Pump.	Cell.	Dual	Split.	Hand.	Scheb.	Grav.	Spl.
Pope-Hartford	Optional	6000	3400	12–14x6	15.6	4	4.75	5.50	36.1	389.9	I.Type	Pairs	H'd.	Pump.	Tube.	Dual	Bosch.	Gov.	Own.	Grav.	For.
Poss	Express	.....	800	5.5x3.1	....	4	....	....	....	.....	.....	En bloc.	.....	Ther.	.....	.....	.....	.....	.....	.....	Spl.
Randolph 14	Optional	2000	1850	.....	12.9	2	5.25	4.75	22.0	205.6	L Head	Sep'rate.	Side.	Ther.	Cell.	Dual	Split.	Hand.	Scheb.	Grav.	For.
Rassel A	Express	2000	1700	8x3.8	13.0	4	4.00	4.50	25.6	226.2	L.Head	Pairs	Side.	Pump.	Tube.	Dual	Bosch.	Hand.	Strom.	Grav.	Spl.
Rassel B	Stake	4000	2400	10x5	15.0	4	4.25	4.50	28.9	255.3	L.Head	Pairs	Side.	Pump.	Tube.	Dual	Bosch.	Hand.	Strom.	Grav.	Spl.
Rassel C	Stake	6000	3400	12.3x5.8	17.6	4	4.63	5.25	34.3	352.8	L.Head	Pairs	Side.	Pump.	Tube.	Dual	Bosch.	Hand	Strom.	Grav	Spl.
Rassel D	Stake	10000	4400	15x6.6	20.5	4	5.00	5.75	40.0	451.6	L.Head	Pairs	Side.	Pump.	Tube.	Dual	Bosch.	Hand.	Strom.	Grav.	Spl.
Regal 30	Delivery	.....	1000	.....	....	4	4.13	4.00	27.3	213.8	L.Head	Pairs	Side.	Ther.	Tube.	Dual	Mich.	Hand.	Scheb.	Grav.	Spl.
Reo H	Express	1500	.....	7x3.8	11or 12	1	4.75	6.00	9.0	106.3	L.Head	Sep'rate.	Side.	Ther.	Tube.	Single	.....	Hand.	.....	Grav.	Spl.
Rogers C	Express	1000	800	5x4	12.1	2	4.75	4.00	18.0	41.7	L.Head	Sep'rate.	Side.	Air	.....	Single	.....	Fixed.	King.	Grav.	For.
Rowe A-B	Express	1500	2250	7.4x3.6	15.0	4	4.25	5.00	28.9	283.6	T.Head	Pairs	Opp.	Pump.	Cell.	Dual	.....	Hand.	.....	Grav.	For.
Sampson 1500-lb	Optional	1500	1400	6.3x3.6	....	2	4.75	4.75	18.0	168.3	L.Head	Sep'rate.	Side.	Ther.	Tube.	Dual	.....	Hand.	Strom.	Grav.	For.
Sampson 1½-ton	Optional	3000	2200	9.6x5	13.5	4	4.00	5.00	25.6	251.3	L.Head	Pairs	Side.	Ther.	Tube.	Dual	.....	Hand.	Strom.	Grav.	For.
Sampson 3-ton	Optional	6000	3400	12x5.5	17.0	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side.	Ther.	Tube.	Dual	.....	Gov.	Strom.	Grav.	For.
Sampson 5-ton	Optional	10000	4750	14x6	20.0	4	5.00	5.50	40.0	431.9	L.Head	Pairs	Side.	Ther.	Tube.	Dual	.....	Hand.	Strom.	Grav.	For.
Sanford J	Optional	2000	1500	8x3.6	12.0	3	4.00	4.50	....	169.6	2-Cycle	Sep'rate.	.....	Air	.....	Single	Bosch.	Fixed.	Own.	Grav.	I.Fl.
Sandusky C	Optional	3000	2400	10x4.3	14.0	4	3.75	5.00	22.5	220.9	L.Head	En bloc.	Side.	Pump.	Tube.	Single	Mea.	Gov.	Scheb.	Grav.	Spl.
Saurer 4½-ton	Optional	9000	5000	12x6	....	4	4.38	5.50	30.6	330.7	T.Head	Pairs	Opp.	Pump.	Cell.	.....	Eisem.	Hand.	Own.	Press.	For.
Saurer 6½-ton	Optional	13000	6000	13x6	....	4	4.38	5.50	30.6	330.7	T.Head	Pairs	Opp.	Pump.	Cell.	.....	Eisem.	Hand.	Own.	Press.	For.
Schacht 21	Optional	8000	3200*	11.5x4–7	20.0	4	4.50	5.00	32.4	318.1	L.Head	En bloc.	Side.	Pump.	Cell.	Double.	Mea.	Hand.	Scheb.	Grav.	For.
Schacht 2-ton	Optional	4000	2700	.....	10.0	4	4.50	5.00	32.4	318.1	L.Head	En bloc.	Side.	Pump	Cell.	Double.	.....	Hand.	Scheb.	Grav.	For.
Schacht D-E	Delivery	.....	975	.....	....	2	5.13	4.50	21.0	185.6	.....	Sep'rate.	.....	Ther.	Cell.	Dual	Split.	Hand.	Scheb.	Grav.	For.

ABBREVIATIONS: Ex., express; Pan., panel; Plat., platform; Cov., covered; St., stake; L. Si., left side; Opp., opposite; H. & S., head and side; R. Si., right side; Ther., thermo-syphon water circulation; Cell., cellular; Tube., tubular; Opt., optional; Gov., governor; Grav., gravity; Spl., splash; For., forced; I. Fl., in fuel; Ell., elliptic; I-b'm., I beam; Rect., rectangular; Sq., square; M. Disc., multiple disc; S. & B., steel and bronze; S. & F., steel and fabric; Ray, raybestos;

Vehicles for the Present Year—Continued

Wheelbase	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANK-SHAFT		BEARINGS				
	Front	Rear	Front	Rear		Type	Friction Surf.	Type	Number Sp.	Location				Service	Emergency	Type	Number	Gearset	Front Wheel	Rear Axle	Steer. Kn'kle	Steer. Gear
86	34x1¾	34x1¾	½ Ell..	Ell....	Sq....	M.Disc.	.....	Plan..	....	U. M..	Chain.	.....	Sq....	Ext...	.....	.....	....	.....	.....	Roller.	.....	.....
96	34x1½	34x1¾	½ Ell..	Ell....	Sq....	M.Disc.	.....	Select.	2	U. M..	Shaft..	.....	Sq....	Ext...	.....	.....	....	.....	.....	Roller.	.....	.....
96	34x1†	34x2	½ Ell..	Ell....	.....	M.Disc.	.....	Plan..	2	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	2	.....	Roller.	Roller.	Plain..	Plain
96	34x1†	34x2	½ Ell..	Ell....	.....	M.Disc.	.....	Plan..	2	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	2	.....	Roller.	Roller.	Plain..	Plain
119	..x2½	..x2½	½ Ell..	.....	I-b'm..	M.Disc.	.....	Plan..	2	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	2	Roller.	.....	Roller.	Plain..	Plain
119	..x2½	..x2½	.....	.....	I-b'm..	M.Disc.	.....	Plan..	2	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	2	.....	.....	Roller.	Plain..	Plain
119	..x3	..x3	.....	.....	Sq....	M.Disc.	Steel...	Plan..	2	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	3	.....	Roller.	Roller.	Plain..	Plain
144	34x3½	34x3	.....	.....	Sq....	Cone...	.....	Select.	3	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	3	.....	Roller.	Roller.	Plain..	Plain
144	34x4	34x4	.....	.....	Sq....	Cone...	.....	Select.	3	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	3	.....	Roller.	Roller.	Plain..	Plain
112	32x3	32x3	½ Ell..	Plat...	I-b'm..	M.Disc.	Steel...	Select.	3	U. M..	Shaft..	R. R...	S.-F...	Int....	Ext...	Plain..	3	Ball...	Ball...	Roller.	Plain..	Ball
85	38x1¾	40x1¾	Ell....	Ell....	Sq....	Disc....	S. & F..	Plan..	2	U. M..	Chain.	R. R...	Solid..	Int....	.....	Plain..	2	.....	Ball...	Ball...	Plain..	Plain
112	32x3½	32x3½	½ Ell..	½ Ell..	I-b'm..	.....	.....	.....	....	.....	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	B&R..	Roller.	Roller.	Plain..	Plain
114–130	36x3	36x3½	.....	.....	I-b'm..	Cone...	L. & I..	Select.	3	Jack..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	B&R..	Roller.	Roller.	Plain..	Plain
124	36x5	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Trans.	.....	Plain..	5	Roller.	Roller.	Roller.	Roller.	Roller
110	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Int....	.....	Plain..	5	Roller.	Roller.	Roller.	Roller.	Ball
138	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Int....	.....	Plain..	5	Roller.	Roller.	Roller.	Roller.	Ball
100	33x2½	34x3	½ Ell..	Ell....	I-b'm..	Cone...	Steel...	Plan..	2	Amid..	Shaft..	R. R...	S.-F...	.....	.....	Plain..	....	Roller.	Ball...	Roller.	Plain..	Plain
100	36x3	36x3½	½ Ell..	Ell....	I-b'm..	Cone...	.....	Select.	3	Amid..	Shaft..	R. R...	S.-F...	.....	Ext...	Plain..	2	Roller.	Plain..	Ball...	Plain..	Ball
100	34x3½	34x4	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Chain.	S&RR..	Dead..	Int....	.....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Ball
126	36x4	36x3	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Chain.	S&RR..	Dead..	Int....	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Roller
130	36x5	36x4	½ Ell..	½ Ell..	I-b'm..	Cone...	Leath..	Select.	3	Amid..	Chain.	S&RR..	Dead..	Trans.	Ext...	Plain..	3	Ball...	Roller.	Roller.	Roller.	Ball
94	36x2	36x2½	½ Ell..	½ Ell..	Sq....	M.Disc.	Steel...	Plan..	2	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	2	Ball...	Ball...	Ball...	Plain..	Plain
113	34x4	34x5	½ Ell..	Ell....	I-b'm..	M.Disc.	S. & C..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	....	Ball...	Roller.	Ball...	.....	Plain
127	34x5	34x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & C..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	Plain..	....	Ball...	Roller.	Ball...	.....	Plain
144	36x6	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Ext...	Int....	B&P..	3	Ball...	Roller.	Ball...	Ball...	Plain
104	36x3½	36x3½	½ Ell..	½ Ell..	Rect..	Cone...	L. & I..	Select.	3	U. M..	Chain.	.....	Dead..	.....	.....	Plain..	2	Ball...	Roller.	Roller.	Plain..	Ball
118	34x4½	34x4½	½ Ell..	Plat...	I-b'm..	Cone...	L. & I..	Select.	2	R. A..	Shaft..	R. R...	Float..	Ext...	Int....	Plain..	3	Roller.	Ball...	Ball...	Plain..	B&P.
115	34x4	34x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	U.M...	Shaft..	.....	Float..	Ext...	Int....	Plain..	....	Ball...	Roller.	Ball...	.....	Plain
126	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	Amid..	Chain.	R. R...	Solid..	Ext...	Int....	Plain..	3	Ball...	Opt...	Opt...	P&B..	P&B.
102	38x3	38x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Plan..	2	U. M..	Shaft..	T. T...	Float..	Trans.	.....	Plain..	2	Roller.	Roller.	Roller.	Plain..	Plain
133	36x3½	36x3	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Plan..	2	U. M..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	2	Roller.	Roller.	Roller.	Roller.	Plain
120	34x3½	34x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Prog..	3	R. A..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Ball...	Plain
144	34x4	36x4	½ Ell..	½ Ell..	Rect..	M.Disc.	Steel...	Prog..	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Ball...	Plain
130	36x3½	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	U. M..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller	P&R..	Plain
150	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	U. M..	Chain.	R. R...	Dead.	Trans.	.....	Plain.	5	Roller.	Roller.	Roller.	P&R..	Plain
151–174	38x6	42x6	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	4	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Ball...	Ball
156	36x5	40x6	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & C.	Select.	3	Amid..	Shaft..	R. R...	Float..	Trans.	Int....	Plain..	3	Ball...	Roller.	B&R..	Plain..	Ball
123	34x3½	34x4	½ Ell..	Plat...	I-b'm..	.....	A. & P.	Frict..	Any	Amid..	Chain.	R. R...	Dead..	E. & I.	.....	.....	....	.....	Roller.	Roller.	Ball...	.....
135	34x5	36x3½	½ Ell..	Plat...	I-b'm..	.....	A. & P.	Frict..	Any	Amid..	Chain.	R. R...	Dead..	E. & I.	.....	Plain..	....	.....	Roller.	Roller.	Ball...	.....
126	36x5	36x4	½ Ell..	.....	I-b'm..	Cone...	L. & C.	Select.	3	Amid..	Chain.	T. R...	Dead..	Ext...	Int....	Plain..	....	Plain..	Roller.	.....	.....	.....
98	34x3½	36x2½	½ Ell..	.....	Tube..	.....	.....	Frict...	Any	.....	Chain.	.....	.....	Int....	Trans.	.....	....	.....	.....	Roller.	.....	.....
96	34x3	36x3½	½ Ell..	Ell....	Tube..	Cone...	Leath..	Select.	3	Jack..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	2	Ball...	Roller.	Roller.	Plain..	Plain
100	36x3	36x3½	½ Ell..	Plat...	I-b'm..	M.Disc.	Steel...	Select.	3	U. M..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Plain
120	36x4	36x5	½ Ell..	Plat...	I-b'm..	M.Disc.	B. & F.	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	.....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
138	36x5	36x4	½ Ell..	Plat...	I-b'm..	M.Disc.	B. & F.	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	.....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
156	40x6	40x5	½ Ell..	Plat...	I-b'm..	M.Disc.	B. & F.	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	.....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
110	32x3½	32x3½	½ Ell..	Ell....	I-b'm..	Cone...	Leath..	Select.	3	R. A..	Shaft..	.....	S.-F...	.....	.....	Plain..	....	Roller.	Ball...	Roller.	.....	Plain
90	36x2	36x2½	½ Ell..	Ell....	I-b'm..	M.Disc.	S. & C..	Plan..	2	U. M..	Chain.	R. R...	Dead..	.....	Trans.	Plain..	2	Plain..	Roller.	Roller.	Plain..	Plain
100	36x2	36x2½	V.Cro.	Ell....	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	2	Ball...	Roller.	Roller.	Plain..	Plain
120	34x3½	34x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	Steel...	Select.	3	Amid..	Shaft..	R. R...	Float..	E. & I.	.....	Plain..	3	Roller.	Roller.	Roller.	B&P..	Roller
94	34x4½	34x4½	½ Ell..	½ Plat.	Rect..	M.Disc.	S. & A..	Select.	3	Amid..	Shaft..	R. R...	Float..	Int....	Ext...	Plain..	2	Roller.	Ball...	Roller.	Plain..	Plain
110	32x4	34x5	½ Ell..	½ Plat.	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Int....	Plain..	3	B&R..	Roller.	Roller.	Roller.	Plain
140	34x4	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	T. R...	Dead..	Int....	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
154	36x6	36x6	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	4	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Roller
88	..x3	..x3	½ Ell..	Plat...	I-b'm..	M.Disc.	.....	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	.....	Plain..	4	Roller.	Roller.	Roller.	Plain..	Roller
106	36x5	36x5	½ Ell..	½ Plat.	Rect..	Cone...	Asb....	Select.	3	U. M..	Chain.	.....	Dead..	Int....	Int....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
153½	36x5	42x5	½ Ell..	½ Ell..	Rect..	Cone...	L. & I..	Select.	4	Amid..	Chain.	R. R...	Dead..	Ext...	.....	Ball...	3	Ball...	Roller.	.....	Ball...	Ball
159	36x5	42x6	½ Ell..	½ Ell..	Rect..	Cone...	L. & I..	Select.	4	Amid..	Chain.	R. R...	Dead..	Trans.	.....	Ball...	3	Ball...	Ball...	.....	Ball...	Ball
144	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	Cone...	Leath..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	2	Roller.	Roller.	Roller.	Roller.	Ball
132	36x4	36x3	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & T..	Select.	3	Amid..	Chain.	.....	Rect..	Int....	Trans.	.....	....	Roller.	Roller.	.....	Roller.	.....
103	32x3½	32x3½	½ Ell..	Ell....	I-b'm..	Cone...	Therm..	Plan..	2	Jack..	Chain.	.....	Solid..	Int....	.....	Plain..	....	Plain..	Roller.	Roller.	.....	Plain

S. & I., steel and iron; L. & C., leather and cork; L. & I., leather and iron; S. & R., steel and raybestos; I. & C., iron and cork; S. & L., steel and leather; Fric., friction; Plan., planetary; Prog., progressive; Amid., amidship; U., unit; Jack, jackshaft; R. A., rear axle; R. R., radius rod; T. T., torsion tube; Int., internal; Ext., external; B. & R., ball and roller; B. P. & R., ball, plain and roller; B. & P., ball and plain. * Maximum.

Table of Specifications of American Commercial

NAME AND MODEL	Body	Weight	Price	Load Platform in Feet	Total Length in Feet	Number Cylinders	Bore	Stroke	H.P., S.A.E.	Piston Displacement	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubrication
														Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
Schmidt F	Optional	.....	$1025	.....	....	2	4.75	4.75	18.0	168.3	.....	Sep'rate	.....	Air	.....	Double	Sim's	.....	Scheb.	Grav.	For.
Schmidt C	Optional	.....	1375	.....	....	2	5.00	5.00	20.0	196.3	.....	Sep'rate	.....	Air	.....	Double	Sim's	.....	Scheb.	Grav.	For.
Seitz	Optional	1500	1500	.....	....	4	3.50	4.50	19.6	173.2	L.Head	Pairs	Side	Pump	Tube	Dual	Remy	Hand	Scheb.	Grav.	For.
Seitz 1-ton	Optional	2000	2000	.....	....	4	4.50	4.50	32.4	286.3	L.Head	Pairs	Side	Pump	Tube	Double	Remy	Hand	Scheb.	Grav.	For.
Seitz 2-ton	Optional	4000	2800	.....	....	4	4.50	5.00	32.4	318.1	L.Head	Pairs	Side	Pump	Tube	Double	Remy	Hand	Scheb.	Grav.	For.
Seitz 3-ton	Optional	6000	3500	.....	....	4	5.00	5.00	40.0	392.7	L.Head	Pairs	Side	Pump	Tube	Dual	Remy	Hand	Scheb.	Grav.	For.
Seitz 5-ton	Optional	10000	4500	.....	....	4	5.50	6.50	48.4	617.7	T.Head	Pairs	Opp	Pump	Tube	Double	Remy	Hand	Scheb.	Grav.	For.
Service A	Delivery	1500	850	6x3.6	13.0	4	3.75	5.25	22.5	231.9	L.Head	En bloc	Side	Pump	.....	Dual	Mich	Hand	King	Grav.	Spl.
Shelby	.....	600–	700	6x4	10.0	2	4.25	5.00	14.5	141.8	.....	.....	.....	Pump	Tube	.....	.....	Hand	Scheb.	Grav.	For.
Shelby ½-ton	Optional	1000	1000	8x5	12.0	2	4.50	5.00	16.2	159.0	L.Head	.....	Side	Pump	Tube	.....	.....	Hand	Scheb.	Grav.	For.
Shelby 5-ton	Optional	10000	3000	14x5.5	18.0	4	4.75	5.00	36.1	354.4	L.Head	Sep'rate	Side	Pump	Tube	Dual	Remy	Hand	Scheb.	Grav.	Spl.
Speedwell 12-Z	Platform	8000	3500	12.5x6.5	18.6	4	5.00	5.00	40.0	392.7	L.Head	Pairs	Side	Pump	Cell	Single	Eisem	Gov	Scheb.	Grav.	Spl.
Speedwell 12-Z	Platform	8000	3500	15.5x6.7	21.6	4	5.00	5.00	40.0	392.7	L.Head	Pairs	Side	Pump	Cell	Single	Eisem	Gov	Scheb.	Grav.	Spl.
Speedwell 12-x	Platform	12000	4500	15.5x6.7	21.6	4	5.00	5.00	40.0	392.7	L.Head	Pairs	Side	Pump	Cell	Single	Eisem	Gov	Scheb.	Press.	Spl.
S & S, E	Optional	4000	3000	12x6	18.0	4	4.75	5.00	36.1	354.4	L.Head	Sep'rate	Side	Pump	Tube	Dual	Eisem	Gov	Scheb.	Grav.	For.
Standard D	Optional	1500	2250	.....	....	4	3.63	4.75	20.3	195.3	.....	Pairs	.....	.....	.....	.....	.....	Hand	Scheb.	.....	Spl.
Standard B	Optional	6000	3400	.....	....	4	4.25	4.50	28.9	255.3	.....	Pairs	.....	.....	.....	.....	.....	Hand	.....	.....	.....
Stearns Standard	Optional	.....	.....	12x6	19.0	4	4.75	6.00	36.1	425.3	L.Head	Sep'rate	Side	.....	.....	Dual	Bosch	.....	Own	.....	Spl.
Stearns Special	Optional	10000	.....	15x6	22.0	4	4.75	6.00	36.1	425.3	L.Head	Sep'rate	Side	.....	.....	Dual	Bosch	.....	Own	.....	Spl.
Stegeman 1-ton	Optional	2000	2250	8x	....	4	3.75	5.25	32.5	231.9	L.Head	En bloc	Side	Pump	Tube	Single	Eisem	Gov	.....	Grav.	For.
Stegeman 2-ton	Optional	4000	2950	10.6x	....	4	4.13	5.25	27.3	280.6	L.Head	En bloc	Side	Pump	Tube	Single	Eisem	Gov	.....	Grav.	For.
Stegeman 3-ton	Optional	6000	3500	11.8x	....	4	4.13	5.25	27.3	280.6	L.Head	En bloc	Side	Pump	Tube	Single	Eisem	Gov	.....	Grav.	For.
Stegeman 4-ton	Optional	8000	3950	12.3x	....	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump	Tube	Single	Eisem	Gov	.....	Grav.	For.
Stegeman 6-ton	Optional	12000	4750	13x	....	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump	Tube	Single	Eisem	Gov	.....	Grav.	For.
Stephenson B	Ex. or St	2000	2000	9x3.6–5	....	4	4.25	5.00	28.9	283.6	T.Head	Pairs	Opp	Pump	Tube	Single	.....	Hand	.....	Grav.	For.
Stephenson C	Ex. or St	6000	3500	14x6	....	4	4.75	5.50	32.1	389.9	T.Head	Pairs	Opp	Pump	Tube	Single	.....	Hand	.....	Grav.	For.
Sternberg 1 to 1½-t'n	Optional	3000	2300	9x5	13.5	4	4.25	4.75	28.9	269.4	T.Head	Pairs	Opp	Pump	Tube	Dual	Eisem	Gov	Strom.	Grav.	For.
Sternberg 2-ton	Optional	4000	2600	10x5	14.5	4	4.25	5.00	38.9	283.6	T.Head	Pairs	Opp	Pump	Tube	Dual	Eisem	Gov	Strom.	Grav.	For.
Sternberg 3½ to 4-t'n	Optional	8000	3750	14x6	19.0	4	4.75	5.50	32.1	389.9	T.Head	Pairs	Opp	Pump	Tube	Dual	Eisem	Gov	Strom.	Grav.	For.
Sternberg 5 to 6-ton	Optional	12000	4500	15x6	20.0	4	5.25	7.00	44.1	606.1	T.Head	Pairs	Opp	Pump	Tube	Dual	Eisem	Gov	Strom.	Grav.	For.
Sullivan 20	Ex. or St	1500	1050	5x3.1	11.5	2	4.50	4.50	16.2	143.1	L.Head	Sep'rate	H&S	Ther	Tube	Single	Bosch	.....	Scheb.	Gray.	For.
Sullivan 51	Express	1500	1000	6x3.5	12.7	2	4.50	4.50	16.2	143.1	L.Head	Sep'rate	H&S	Ther	Tube	Single	Bosch	.....	Scheb.	Grav.	For.
United States	Optional	.....	.....	.....	.....	4	4.75	5.00	36.1	354.4	.....	.....	.....	Pump	Cell	.....	.....	.....	.....	.....	.....
Universal A	Platform	6000	3350	12.3x6	17.0	4	4.00	5.50	25.6	276.5	T'Head	Pairs	Opp	Pump	Cell	Dual	Bosch	Hand	Rayf.	Grav.	For.
U. S., B	Optional	2000	1950	9.5x4	13.0	2	5.25	4.50	22.0	194.8	L.Head	Sep'rate	Side	Ther	Tube	Single	.....	Hand	Scheb.	Grav.	For.
U. S., C	Optional	3000	2175	9.5x4	13.0	4	4.00	4.00	25.6	201.1	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Gov	Scheb.	Grav.	Spl.
U. S., D	Optional	6000	.....	12x4.5–6	17.0	4	4.50	5.50	32.4	349.9	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Gov	Scheb.	Grav.	For.
VanDyke E	Express	1000	1000	6.5x3.8	10.3	2	4.50	6.00	32.4	190.8	L.Head	Sep'rate	Side	Pump	Cell	Dual	S-X	Hand	Opt.	Grav.	For.
Van 102-A	Optional	2000	1650	.....	16.5	4	4.00	4.00	25.6	201.1	I.Type	Pairs	H'd	Ther	Tube	Dual	Split	Hand	Strom.	Opt.	Spl.
Van 103-B	Optional	3000	1900	.....	17.5	4	4.09	4.50	27.1	233.3	L.Head	En bloc	Side	Pump	Tube	Dual	Split	Hand	Strom.	Opt.	For.
Veerac 1912	Optional	1500	850	7.2x3.1-4	11.6	2	4.00	4.00	....	100.5	2-Cycle	Sep'rate	.....	Air	.....	Single	.....	Hand	Holl'y.	Grav.	I.Fl.
Velie Y	Platform	3000	3000	12x5.5	19.0	4	4.00	5.25	25.6	263.9	L.Head	Pairs	Side	Pump	Cell	Double	Split	Gov	Strom.	Grav.	Spl.
Velie Z	Platform	6000	3500	Optional	23.0	4	4.50	5.25	32.4	334.0	L.Head	Pairs	Side	Pump	Cell	Double	Split	Gov	Strom.	Grav.	Spl.
Victor A	Ex. or St	1500	1750	7x3.5	....	4	3.75	4.50	22.5	198.8	.....	.....	.....	Pump	Cell	.....	Bosch	.....	.....	.....	For.
Victor B	Optional	2000	2000	.....	....	4	4.00	4.50	25.6	226.2	.....	.....	.....	Pump	Cell	.....	Bosch	.....	.....	.....	For.
Victor C	Optional	4000	2800	.....	....	4	4.13	5.25	27.3	280.6	.....	.....	.....	Pump	Cell	.....	Bosch	.....	.....	.....	For.
Victor D	Optional	6000	3350	.....	....	4	4.88	5.50	38.0	410.6	.....	.....	.....	Pump	Cell	.....	Bosch	.....	.....	.....	For.
Victor	Bus	.....	3750	.....	....	4	4.88	5.50	38.0	410.6	.....	.....	.....	Pump	Cell	.....	Bosch	.....	.....	.....	For.
Victor E	Optional	10000	4300	.....	....	4	5.25	6.00	44.0	519.5	.....	.....	.....	Pump	Cell	.....	Bosch	.....	.....	.....	For.
Victor	Fire Comb	.....	4600	.....	....	4	4.25	6.00	44.1	519.5	.....	.....	.....	Pump	.....	.....	Bosch	.....	.....	.....	Spl.
Victor F	Optional	14000	5200	.....	....	4	5.00	6.50	40.0	510.5	.....	.....	Cell	Pump	.....	.....	Bosch	.....	.....	.....	Spl.
Victor G	Optional	20000	5800	.....	....	4	5.75	6.00	53.0	623.2	.....	.....	Cell	Pump	.....	.....	Bosch	.....	.....	.....	Spl.
Victor	H'k & Lad	.....	5000	.....	....	4	5.75	6.00	53.0	623.2	.....	.....	.....	Pump	.....	.....	Bosch	.....	.....	.....	Spl.
Victor	Fire Comb	.....	5800	.....	....	6	4.87	5.50	57.0	615.9	.....	.....	.....	Pump	.....	.....	Bosch	.....	.....	.....	Spl.
Victor	Fire Comb	.....	6500	.....	....	6	5.50	6.50	72.6	926.6	.....	.....	.....	Pump	.....	.....	Bosch	.....	.....	.....	Spl.
Walter 2-ton	Optional	4000	3000	.....	....	4	4.00	4.00	25.6	201.1	L.Head	Pairs	Side	Pump	Cell	Dual	Bosch	Fixed	Strom.	Grav.	For.
Ward G-2-A	Del. & St	.....	2100	.....	....	4	4.00	4.50	25.6	226.2	.....	Pairs	.....	.....	Cell	.....	Split	.....	Strom.	.....	Spl.
Warren 12-30	Express	1000	1325	5.3x3.8	....	4	4.00	4.50	25.6	226.2	L.Head	En bloc	Side	Pump	Tube	Double	Bosch	Fixed	McC'd.	Grav.	Spl.
White G-B-E	Optional	1500	2250	.....	....	4	3.75	5.13	32.5	226.4	L.Head	En bloc	Side	Pump	Cell	Single	Bosch	.....	Own	Grav.	For.
White G-T-B	Optional	3000	3150	.....	....	4	3.75	5.13	32.5	226.4	L.Head	En bloc	Side	Pump	Cell	Single	Bosch	.....	Own	Grav.	For.
White G-T-A	Optional	6000	3850	.....	....	4	3.75	5.13	32.5	226.5	L.Head	En bloc	Side	Pump	Cell	Single	Bosch	.....	Own	Grav.	For.
White T-C	Platform	10000	4700	.....	....	4	4.25	7.55	28.9	326.3	L.Head	En bloc	Side	Pump	Cell	Single	Bosch	.....	Own	Grav.	For.
Whitesides	Optional	1500	1450	Optional	Opt.	4	4.50	4.50	32.4	286.3	L.Head	En bloc	Side	Ther	Cell	Double	Split	Hand	Marv'l	Grav.	For.
Wichita A	Optional	1200	1450	6.5x3.9	....	4	3.25	5.00	16.9	165.9	L.Head	En bloc	Side	Ther	Tube	Single	Bosch	Hand	.....	Grav.	For.
Wichita B	Optional	2000	1750	8.5x6	....	4	3.25	5.00	16.9	165.9	L.Head	En bloc	Side	Ther	Tube	Single	Bosch	Hand	.....	Grav.	For.
Wilcox I	Optional	2000	2300	Optional	17	4	4.25	4.50	38.9	255.3	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Hand	Ben't	Grav.	Spl.
Wilcox K	Optional	3000	2500	Optional	18	4	4.25	4.50	38.9	255.3	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Hand	Ben't	Grav.	Spl.
Wilcox J	Optional	6000	3250	Optional	20	4	4.25	4.50	38.9	255.3	L.Head	Pairs	Side	Pump	Tube	Dual	Bosch	Hand	Ben't	Grav.	Spl.

ABBREVIATIONS: Ex., express; Pan., panel; Plat., platform; Cov., covered; St., stake; L. Si., left side; Opp., opposite; H. & S., head and side; R. Si., right side; Ther., thermo-syphon water circulation; Cell., cellular; Tube., tubular; Opt., optional; Gov., governor; Grav., gravity; Spl., splash; For., forced; I. Fl., in fuel; Ell., elliptic; I-b'm., I beam; Rect., rectangular; Sq., square; M. Disc., multiple disc; S. & B., steel and bronze; S. & F., steel and fabric; Ray, raybestos;

Vehicles for the Present Year—Concluded

Wheelbase	TIRES		SPRINGS			CLUTCH		GEARSET					BRAKES		CRANK-SHAFT		BEARINGS				
	Front	Rear	Front	Rear	Front Axle	Type	Friction Surf.	Type	Number Sp.	Location	Drive	Car Drives Through	Rear Axle	Service	Emergency	Type	Number	Gearset	Front Wheel	Rear Axle	Steer. Kn'kle	Steer. Gear
92	36x2	38x2	½ Ell..	Ell....	Opt...	M.Disc.	Fibre...	Plan..	2	.....	Chain.	.....	Sq....	Int....	.....	Plain..	....	.....	Ball...	Ball...	.....	B&W.
96	36x2½	38x2½	½ Ell..	Ell....	Opt...	M.Disc.	Fibre...	Plan..	2	.....	Chain.	.....	Sq....	Int....	.....	Plain..	....	.....	Ball...	Ball...	.....	B&W.
92	34x3	34x3	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	Springs.	Float..	.....	Trans.	.....	....	.....	Roller.	Roller.	Ball...	Ball
108	36x3½	36x3½	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R...	Dead..	.....	Trans.	.....	....	.....	Roller.	Roller.	Ball...	Ball
118	36x4	36x2½	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R...	Dead..	.....	Trans.	.....	....	.....	Roller.	Roller.	Ball...	Ball
124	36x5	36x3½	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R...	Dead..	.....	Trans.	.....	....	.....	Roller.	Roller.	Ball...	Ball
130	36x6	40x4	½ Ell..	½ Ell..	I-b'm..	.....	.....	Frict..	Any	Amid..	Chain.	R. R...	Dead..	.....	Trans.	.....	....	.....	Roller.	Roller.	Ball...	Ball
114	..x2	..x2	½ Ell..	½ Ell..	Sq....	.....	.....	Frict..	Any	Amid..	Chain.	R. R...	Dead..	Int....	.....	Plain..	3	.....	Ball...	Ball...	Ball...	Plain
106	38x1½	38x1½	½ Ell..	½ Ell..	Sq....	M.Disc.	.....	Plan..	2	U. M..	Shaft..	T. T....	S.-F...	Ext...	Int....	Plain..	2	.....	Ball...	Roller	Ball...	Ball.
110	36x2	36x2½	½ Ell..	½ Ell..	Sq....	M.Disc.	.....	Plan..	2	U. M..	Shaft..	T. T....	S.-F...	Int....	Int....	Plain..	2	.....	Ball...	Roller.	Ball...	Ball
150	36x4	36x5	½ Ell..	Plat...	I-b'm..	Cone...	Leath..	Select.	3	U. M..	Chain.	T. T. & R. R.	Dead..	Int....	Int....	Plain..	5	Roller.	Ball...	Ball...	Ball...	Ball
115	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
139	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
139	36x5½	36x5½	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
125	32x4	34x4	½ Ell..	Plat...	I-b'm..	Cone...	S. & L..	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	5	Ball...	Roller.	Roller.	Roller.	Ball
112	32x4	32x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	3	.....	Shaft..	.....	Float..	Int....	Int....	.....	....	Ball...	.....	Ball...	.....	.....
108	36x4	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	.....	Select.	2	.....	Chain.	.....	Sq....	.....	.....	.....	....	Ball...	.....	Roller.	.....	.....
144	34x5	38x4½	.....	.....	Solid..	M.Disc.	.....	Select.	4	.....	Chain.	.....	Solid..	Int....	Int....	.....	....	Roller.	.....	.....	.....	.....
180	34x5	38x4½	.....	.....	Solid..	M.Disc.	.....	Select.	4	.....	Chain.	.....	Solid..	Int....	Int....	.....	....	Roller.	.....	.....	.....	.....
130	34x3	34x4½	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & A..	Select.	3	U. M..	Shaft..	R. R...	Float..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	B&P..	B&P.
140	34x4	36x3	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & A..	Select.	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	B&P..	B&P.
150	36x4	38x4	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & A..	Select.	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	B&P..	B&P.
155	36x5	40x5	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & A..	Select.	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	B&P..	B&P.
165	36x6	40x6	½ Ell..	½ Ell..	Rect..	M.Disc.	S. & A..	Select.	3	U. M..	Chain.	R. R...	Dead..	Ext...	Int....	Plain..	3	Ball...	Ball...	Ball...	B&P..	B&P.
112	40x3½	40x3½	½ Ell..	½ Plat.	.....	.....	.....	Frict..	Any	U. M..	Chain.	.....	Dead..	Int....	.....	Plain..	3	.....	Ball...	Ball...	Ball...	Plain
136	42x5	42x5	½ Ell..	½ Plat.	.....	.....	.....	Frict..	Any	Amid..	Chain.	.....	Dead..	Int....	.....	Plain..	3	.....	Ball...	Ball...	Ball...	Plain
110	34x3½	36x4	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Float..	.....	.....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
116	34x4	36x5	½ Ell..	Plat...	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
144	36x5	40x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	.....	Plain..	3	Ball...	Roller.	Roller.	Plain..	Ball
152	36x6	42x6	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	.....	Dead..	Int....	Int....	Plain..	....	Ball...	Roller.	Roller.	.....	Ball
92	36x2½	36x2½	Ell....	Ell....	Sq....	Cone...	Steel...	Plan..	2	U. M..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	2	Plain..	Ball...	Ball...	Plain..	Ball
110	36x2½	36x2½	Ell....	Ell....	Sq....	Cone...	Steel...	Plan..	2	U. M..	Chain.	R. R...	Dead..	Int....	Trans.	Plain..	2	Plain..	Ball...	Ball...	Plain..	Ball
138	36x4½	36x4½	.....	.....	I'-bm..	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	Roller.	.....	.....
132	36x5	36x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	R. & S..	Select.	3	Jack..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller.	Plain..	Plain
118	36x3	36x3½	½ Ell..	Ell....	Sq....	Cone...	R. & S..	Select.	3	Jack..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	2	Roller.	Roller.	Roller.	Ball...	Ball
118	34x3½	36x4	½ Ell..	Ell....	Sq....	Cone...	R. & S..	Select.	3	Jack..	Chain.	R. R...	Dead..	Trans.	Int....	Plain..	3	Ball...	Roller.	Roller.	Ball...	Plain
144	34x5	36x5	½ Ell..	½ Ell..	I-b'm..	.....	R. & S..	Select.	3	Jack..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	Ball...	Roller.	Roller.	Roller.	Plain
86	32x3	32x3	½ Ell..	Plat...	Tube..	.....	.....	Frict..	Any	.....	Shaft..	Springs.	S.-F...	Ext...	Int....	Plain..	2	.....	Roller.	Roller.	Plain..	Plain
118	36x3	40x3½	½ Ell..	Plat...	Rect..	Cone...	.....	Select.	3	Amid..	Chain.	R. R...	Dead	.....	.....	Plain..	3	Ball...	Ball...	Ball...	Ball..	Plain
130	36x3½	40x4	½ Ell..	Plat...	Rect..	Cone...	.....	Select.	3	Amid..	Chain.	R. R...	Dead..	Ext...	.....	Plain..	3	Ball...	Ball...	Ball...	Ball..	Plain
82	..x2	..x2	½ Ell..	Ell....	Sq....	M.Disc.	.....	Plan..	2	U. M..	Chain.	.....	Dead..	Int....	.....	Plain..	2	Plain..	Ball...	Ball...	Plain..	Plain
148–172	36x5	36x3½	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	S&RR..	Dead..	Int....	Int....	Ball...	3	Roller.	Roller.	Roller.	Plain..	Ball
148	36x5	40x5	½ Ell..	½ Ell..	I-b'm..	M.Disc.	S. & B..	Select.	3	Amid..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball
105	34x2½	34x3	½ Ell..	½ Ell..	Rect..	M.Disc.	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	.....	.....	.....
120	34x3	34x4	½ Ell..	½ Ell..	Rect..	M.Disc.	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	.....
140	36x4	36x3	½ Ell..	½ Ell..	I-b'm..	Opt....	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	.....	.....	.....
146	36x5	36x4	½ Ell..	½ Ell..	I-b'm..	Opt....	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	.....
140	36x4	36x3	½ Ell..	½ Ell..	I-b'm..	Opt....	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	.....
146–158	36x6	36x5	½ Ell..	½ Ell..	I-b'm..	Opt....	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	.....
140	40x6	40x6	.....	.....	I-b'm..	Cone...	.....	Select.	3	.....	.....	.....	Rect..	Int....	Ext...	.....	....	Roller.	.....	Roller.	.....	.....
146–158	36x7	42x6	½ Ell..	½ Ell..	I-b'm..	Opt....	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	.....
146–158	36x7	44x7	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	3	.....	.....	.....	Dead..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	.....
204	36x4	38x3½	.....	.....	I-b'm..	Cone...	.....	Select.	3	.....	.....	.....	Rect..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	Worm.
168	36x4	36x3½	.....	.....	I-b'm..	Cone...	.....	Select.	3	.....	.....	.....	Rect..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	Worm.
168	36x5	36x4	.....	.....	I-b'm..	Cone...	.....	Select.	3	.....	.....	.....	Rect..	Int....	Ext...	.....	....	.....	.....	Roller.	.....	Worm.
124	36x4	36x5	½ Ell..	Plat...	Sq....	Cone...	Fabric..	Select.	3	Amid..	Chain.	R. R...	Dead..	.....	.....	B&P..	3	Ball...	Ball...	Ball...	Ball...	Roller
124	32x4½	32x4½	½ Ell..	½ Ell..	I-b'm..	M'Disc.	.....	Select.	3	Amid..	Shaft..	.....	Float..	Ext...	Int....	Plain..	....	Ball...	Ball...	Ball...	.....	.....
110	32x4	32x4	½ Ell..	½ Ell..	I-b'm..	Cone...	L. & I..	Select.	3	Amid..	Shaft..	Springs.	S.-F...	Ext...	Int....	Plain..	2	Plain..	Ball...	Roller.	Plain..	Plain
120	34x4½	34x4½	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	4	Amid..	.....	.....	.....	Ext...	Int....	Ball...	....	Ball...	Ball...	Ball...	Ball...	Ball
144	36x4½	36x4½	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	4	Amid..	.....	.....	.....	Ext...	Int....	Ball...	....	Ball...	Ball...	Ball...	Ball...	Ball
144	36x5	40x4	½ Ell..	½ Ell..	I-b'm..	Cone...	.....	Select.	4	Amid..	.....	.....	.....	Ext...	Int....	Ball...	....	Ball...	Ball...	Ball...	Ball...	Ball
162	41x6	41x6	.....	½ Ell..	Solid..	Cone...	Leath..	Select.	4	.....	Chain.	.....	.....	Ext...	Int....	Ball...	....	Ball...	Ball...	Ball...	Ball...	Ball
118	34x2½	34x2½	Ell....	Ell....	I-b'm..	M.Disc.	B. & F..	Plan..	2	Amid..	Chain.	.....	Dead..	Int....	.....	Plain..	2	Ball...	Roller.	.....	Plain..	B&P.
104	34x3	34x3	½ Ell..	½ Ell..	I-b'm..	Cone...	A. & I..	Prog..	3	U. M..	Chain.	R. R...	Dead..	Int....	.....	Plain..	2	B. & R	Ball...	Ball...	Plain..	B&P.
112	34x3	34x4	½ Ell..	½ Ell..	Rect..	Cone...	A. & I..	Prog..	3	U. M..	Chain.	R. R...	Dead..	Int....	.....	Plain..	2	B&R..	Ball...	Ball...	Plain..	B&P.
117	36x3	36x3½	Ell....	Plat...	I-b'm..	Cone...	Therm..	Select.	3	Amid..	Chain.	R. R...	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball
117	36x3½	36x4	Ell....	Plat...	I-b'm..	Cone...	Therm..	Select.	3	Amid..	Chain.	R. R.	Dead..	Trans.	.....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball
126	36x4	36x3½	Ell....	Plat...	I-b'm..	Cone...	Therm..	Select.	3	Amid..	Chain.	R. R.	R'nd..	Int....	Int....	Plain..	3	Roller.	Roller.	Roller.	Roller.	Ball

S. & I., steel and iron; L. & C., leather and cork; L. & I., leather and iron; S. & R., steel and raybestos; I. & C., iron and cork; S. & L., steel and leather; Fric., friction; Plan., planetary; Prog., progressive; Amid., amidship; U., unit; Jack, jackshaft; R. A., rear axle; R. R., radius rod; T. T., torsion tube; Int., internal; Ext., external; B. & R., ball and roller; B. P. & R., ball, plain and roller; B. & P., ball and plain.

Principal Features of the Commercial

REMARKABLE progress has been made in the building of commercial cars, as a study of the following pages will indicate. The changes made in the various makes of cars shown at the Garden and Palace exhibits are here taken up and it is interesting to note the various trends of practice as they are suggested by these alterations. Many new cars are being exhibited this year and in other cases, where the manufacturers were known, it was through their connection with the manufacture of pleasure cars and not those used for commercial purposes. On the other hand, there are many who have already borne the test of time.

Alco—This concern makes four types of truck of 2, 3 1-2, 5 and 6 1-2 tons capacity. There are two types of motor which are fitted to these trucks, one having a bore of 4 1-2 and stroke of 5 1-2 inches and being fitted to the truck of 2 tons capacity and the other having a bore of 5 inches and a stroke of 6 inches and being fitted to all the rest of the trucks. The smaller motor is rated at 30 horsepower at 1,000 revolutions and the larger is rated at 36 horsepower at 811 revolutions, at which the 3 1-2-ton car is designed to run, and 40 horsepower at 1,000 revolutions, at which the larger cars reach their maximum road speed. Carburetion is effected on all the motors by means of the Newcomb float feed carbureter, and the gasoline is fed to the carbureter by gravity. The throttle of the gas is operated from the driver's seat by means of a lever on the steering wheel. Ignition is by means of the Bosch dual system with Bosch high tension magneto; the ignition system is also controlled by lever from the top of the steering wheel. Lubrication is effected by combination force feed and splash system; there is sight feed located on the dash by means of which the driver is enabled to gauge the supply of oil in the reservoir. The motors are all cooled by water which is circulated by a centrifugal pump and sent through a radiator of the cellular type on the two larger trucks and tubular on the smaller two. The clutches used are all of the multiple disk type with facings of bronze and steel. The gearsets are also of the same type on all models of cars, these being of the three-speed and reverse selective sliding type and transmit the power to the propellor tube, from which the drive is taken up by means of a counter shaft and chains to the wheels on dead square axles. The wheelbase of the 2-ton truck is 112 inches, of the 3 1-2 ton, 126 inches; of 5-ton, 144, and the 6 1-2-ton, 164 inches.

1. Hewitt 10-ton coal truck
2. Speedwell brewery wagon
3. Atterbury dumping type truck

Atterbury—Models B. C and D, being respectively of 1, 2 and 3 tons capacity, are the offerings of the Atterbury Motor Car Company, of Buffalo, for 1912. There are few differences to be noted in construction between the various models except for size. The 3-ton truck has a multiple disk clutch, while the others are of the dry plate type. Model B has a wheelbase of 125 inches; Model C, 144 inches, and Model D, 154 inches. The maximum rated speeds are 20, 16 and 13 miles an hour respectively. In the 1-ton and 2-ton trucks the cylinders are cast en bloc and rate at 25.6 and 28.9 horsepower, while the 3-ton model has four cylinders cast in pairs, measuring 4 7-8 by 5 1-2 inches, rating at 38.1 horsepower, but developing more than that amount of power on the brake test. Schebler carbureters, Bosch ingntion and force feed lubrication are common to all the models.

Autocar—This truck from Ardmore, Pa., is built in a 3,000-pound type, with a full body option to the purchaser. The wheelbase is 97 inches and tread 58 inches. The weight of the complete vehicle is 3,600 pounds. The frame is wood-lined steel, with a tubular front axle and floating rear axle, a shaft taking the drive from the three-speed progressive transmission to the differential. The motor has two horizontal cylinders, 4 3-4 by 4 1-2 inches, giving 18 horsepower S. A. E. It is cooled by water circulated through the jackets and the vertical tube radiator by means of a pump. No fan is used. The plate clutch is of steel and cork inserts. Tires are solid or pneumatic, at the purchaser's option, 34 by 3 1-2 inches in front and 34 by 4 rear.

Best—The Durant-Dort offering for 1912 consists of a car designed to carry a load of 800 pounds. The motor is of two cylinders measuring 4.5 inches square and rated at 12 horsepower. This car retains the friction transmission principle and elliptic rear springs and cooling system by thermo syphon. Kingston carbureter, dual ignition, pump lubrication, wheelbase of 76 inches and a maximum speed of 18 miles an hour are some of the main characteristics.

Brush—The Brush delivery car presented by the Brush Runabout Company is a car of 600 pounds carrying capacity, having a wheelbase of 88 inches and a 54-inch tread. The motor is similar to the one used in the pleasure vehicle, being of one cylinder, water-cooled. The wooden axles and other distinctive features are continued.

Buick—The Buick Motor Company is putting out a two-cylinder car with a load capacity of 1,000 pounds. The wheelbase is 92 inches and tread standard. The car is said to have a speed of 30 miles an hour and the motor is rated at 22

Cars on the American Market for 1912

horsepower. The chassis is similar to the two-cylinder model of pleasure cars and lists at $1,000.

Cartercar—Model T is the new number of the Cartercar Company line in the commercial field. This car is a big delivery or small truck, depending on the style of body equipment. It has a carrying capacity of from 1,000 to 1,500 pounds and is made with three types of body, namely: Full panel, screen and open. The chassis has a wheelbase of 98 inches with standard tread. The motor is advertised to deliver a maximum speed of 22 miles an hour and is of two-cylinder horizontal-opposed type. The engine rates as of 18-horsepower, the bore and stroke being 4 1-2 by 5 1-2 inches of the four-cycle variety. Schebler float carbureter; Remy ignition; mechanical oiler; vertical tube radiator under dash; friction gears and single chain drive to jackshaft with double chains to wheel describe a few of the salient points of construction. The car sells for $1,250, equipped with open stake body.

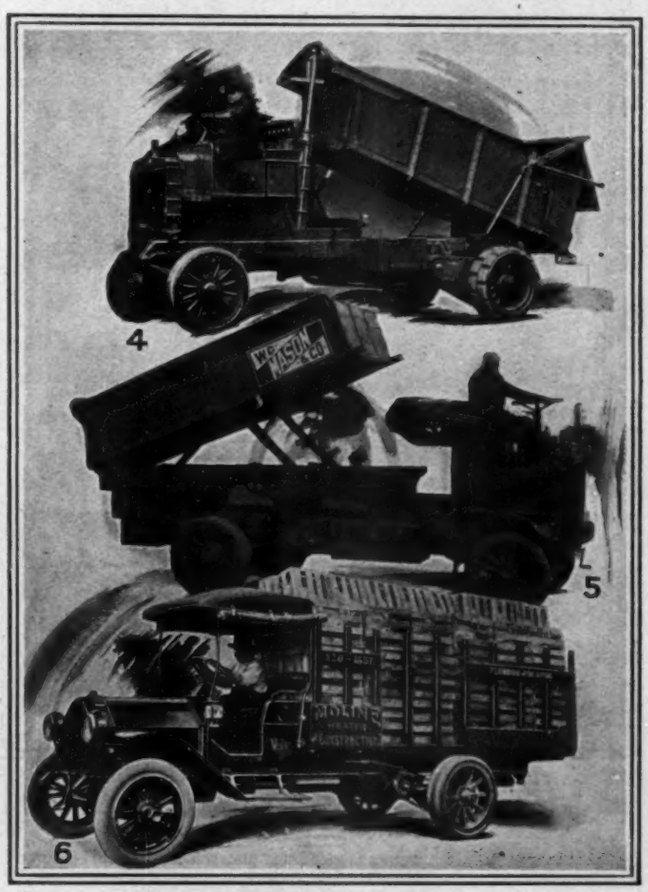
Chase—The Chase Motor Truck Company, of Syracuse, N. Y., builds a 2-ton, 1 1-2-ton, a 1-ton and a 1,500-pound vehicle. The 2-ton truck, having a wheelbase of 120 inches and a tread of 62 inches, has three two-cycle cylinders of 4 1-2 by 5 inches. The lubricating oil is mixed with the gasoline. Air cooling is used, the suction being produced by vanes in the flywheel. A cast-iron cone clutch with cork inserts co-operates with a three-speed gearset, which drives a jackshaft and by chains the axle. Tires are 36 by 3 1-2 inches front, and 38 by 4 inches rear. Price $2,200. The 1-ton affair has the same motor and system of transmitting the drive, but has 36 by 3-inch tires in front and 38 by 3 1-2 rear. A drop-forged, square section front axle is used in place of the I-beam. The wheelbase is 112 inches. The 1-ton truck gives 20 horsepower, and is constructed along similar lines. Tire sections are 1 inch smaller and the wheelbase is 106 inches, with the tread reduced to 58 inches, and the price to $1,400, including an express body. With a planetary transmission it sells for $1,250. The small type costs $900 and has a motor of 4 1-8 by 4 inches, three cylinders and equipped as in the larger types. Wheelbase is 100 inches, tread 58 inches. Tires are the same as in the preceding size, and a planetary gearset is used.

Commer—Wyckoff, Church & Partridge, Inc., present three models of the Commer truck for 1912. These are all big cars, one model being of 6,000 pounds capacity; another of 8,000 pounds and the third 13,000 pounds. The cylinders of the motors are all cast in pairs and rate respectively at 25, 30 and 40 horsepower. The wheelbase of the two smaller models is 132 inches, while in the 6 1-2-ton model the length is 144 inches. The big car is 264 inches overall. Commer carbureter; Bosch ignition; pump lubrication; tubular radiator; cone clutch; individual clutch transmission; drive by chains; W. & S. steering gear; and brakes on hubs and jackshaft, are other specifications. The cars list at $5,000, $5,500 and $6,500 respectively.

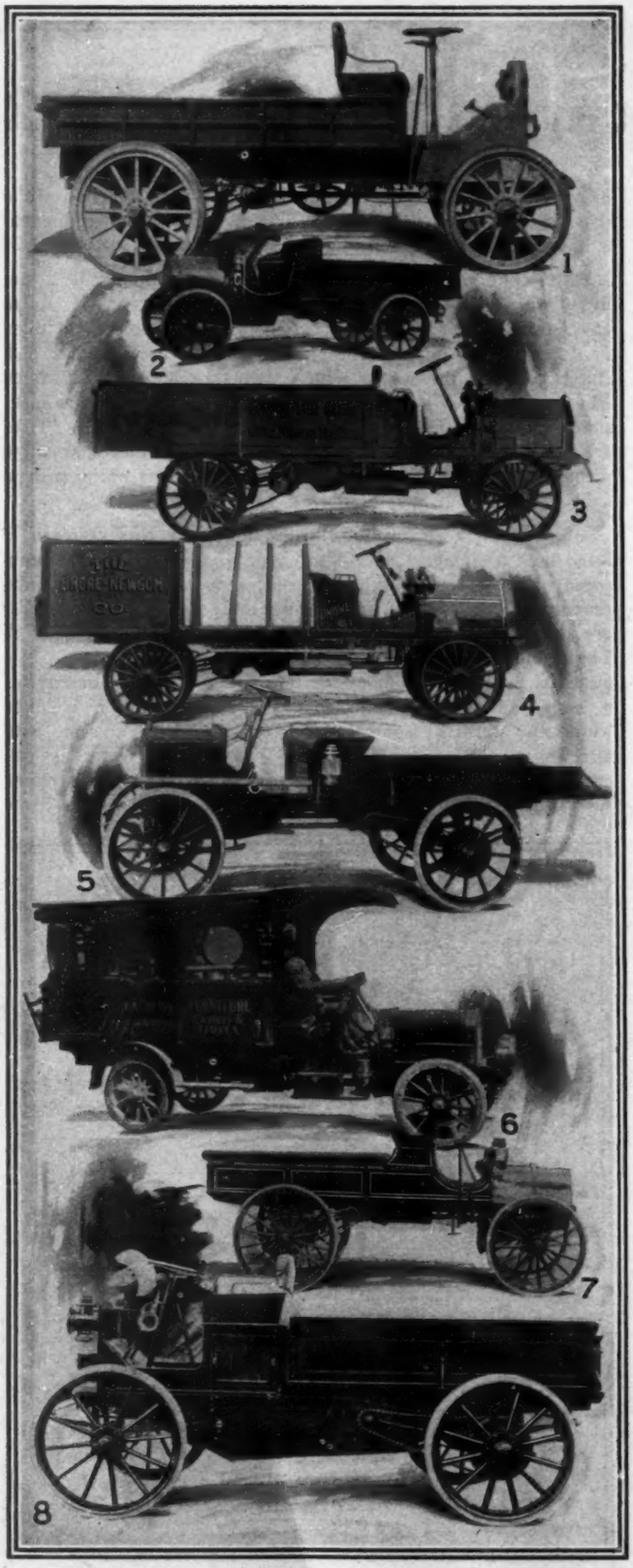
Cortland—The Cortland motor wagon will be made in two sizes for this year. These are the 1,500-pound and the 3,000-pound models. The motors are horizontal of the two-cylinder, four-cycle type. On the smaller vehicle the motor dimensions are 4 1-4 inches by 4 1-4 inches, and on the other, 5 inches by 5 inches. The rated horsepowers are 16 and 24, respectively. The drivers' seats are located above the motors. Ignition is accomplished by means of a combination battery and magneto system. Two speeds forward and a reverse, planetary transmission, asbestos lined cone clutch, dead square section rear axle, with elliptic springs in front and three-quarter elliptic springs in rear and solid rubber tires are other features of this line. The wheelbase of the smaller model is 94 inches, while that of the other is 8 inches longer. The usual equipment is included and the vehicles have a selling price of $920.

Dart—The product of the Dart Mfg. Company is a delivery wagon of from 1,000 to 1,500 pounds capacity. It has 18 horsepower generated in two cylinders, water-cooled and oiled by force-feed system. A thermo-syphon is used, and a disk clutch connects the motor with a two-speed planetary gearset. The final drive is by chain. The service break is on the jackshaft and the emergencies are in the rearwheel drums. Tires are 1 3-4 solids all around. The wheelbase is 80 inches, tread 56 inches, and price $650 with an express body, while with a panel type of body it is $750.

Decatur—The 3,000-pound truck made by this concern is fitted with a standard flare board type of body. The maximum speed of the car is 30 miles an hour, at a motor speed of 1,200 revolutions per minute. The bore and stroke of the motor are the same, being 4 inches, and the rated horsepower is 30. The cylinders are four in number and are cast singly. The motor is of the four-cycle type. A Rayfield carbureter is employed and a Simms magneto. The ignition is fixed while the throttle control is from the driver's seat with a lever on the steering wheel. The cooling water is circulated through a cellular radiator by a centrifugal pump. A belt-driven fan is also part of the system. The Hele-Shaw



4. Sampson covered type body
5. Pope-Hartford dumping body
6. Velie express type truck



1. Cartercar delivery wagon
2. Bowling Green small delivery
3. McIntyre platform type truck
4. McIntyre
5. Mora delivery wagon
6. Cass express body truck
7. Chase small delivery
8. Reo platform type

clutch transmits the power to the three speed selective gearset located in the center. The drive is then taken up by chains to the rear wheels. The rear axle is of the dead type. The wheelbase is 129 inches and the tread 56 inches.

Detroit—The Detroit Motor Wagon Company is putting out a model A commercial car of 800 pounds capacity. The motor is of the two-cylinder, two-cycle type, the cylinders being cast separately. The rated horsepower is 16, and the bore and stroke are 4 inches. Thermo-syphon cooling is used, the fan being located in the flywheel. Planetary transmission with two forward speeds is employed, and the power is conveyed to the rear wheels through jackshafts and side chains. The rear axles are of square section, and hard rubber tires are used. The clutch is of the disk type; service brake has foot control and acts on the jackshaft. Three body types are supplied—open express, stake and full panel. The price ranges from $610 to $740.

Durable Dayton—Models H and K constitute the line of the Dayton Auto Truck Company, of Dayton, O., for 1912. Model H has a load capacity of from 3,000 to 4,000 pounds, while model K is of 3 tons capacity. Save for a difference in size in favor of model K, the chassis are identical. Model H is 10 feet long on its wheelbase, while model K is 136 inches. The tread of the big car is 1 inch wider than the other. The motor is water-cooled, and has the cylinders, cast in pairs, located under the seat. The engine is of the four-cylinder type and in the big car the cylinders measure 4 3-4 by 5 1-2 inches. Stromberg carbureter; Bosch ignition and batteries, controlled from the steering wheel; lubrication by gear-driven pump through all main bearings, multiple disk clutch; selective sliding gear, giving three forward speeds; drive by propeller shaft to dead rear axle. are some of the features. Model H sells for $2,500 and model K lists at $3,500.

Eclipse—This concern makes two models of truck—one of from 2,000 to 2,500 pounds capacity and the other of 3 to 4 tons capacity. Both motors are of the four-cylinder, four-cycle type, the smaller having a bore and stroke of 4 inches and the larger having a bore of 4 1-2 inches and a stroke of 5 1-2 inches. The ratings are respectively 30 and 45 horsepower at 1,200 revolutions a minute. The radiators are of the Bush tubular type suspended upon springs, the water being circulated by centrifugal pump. The carbureters employed are of the Stromberg type with gasoline fed by gravity from the fuel tank. The ignition on both cars is by the Bosch high tension dual system. The clutches are leather-faced cone variety fitted with flat springs beneath the leather. The drive is by chain to the rear wheels. The wheelbase is 106 inches on the small car and 120 and 144 inches on the large car.

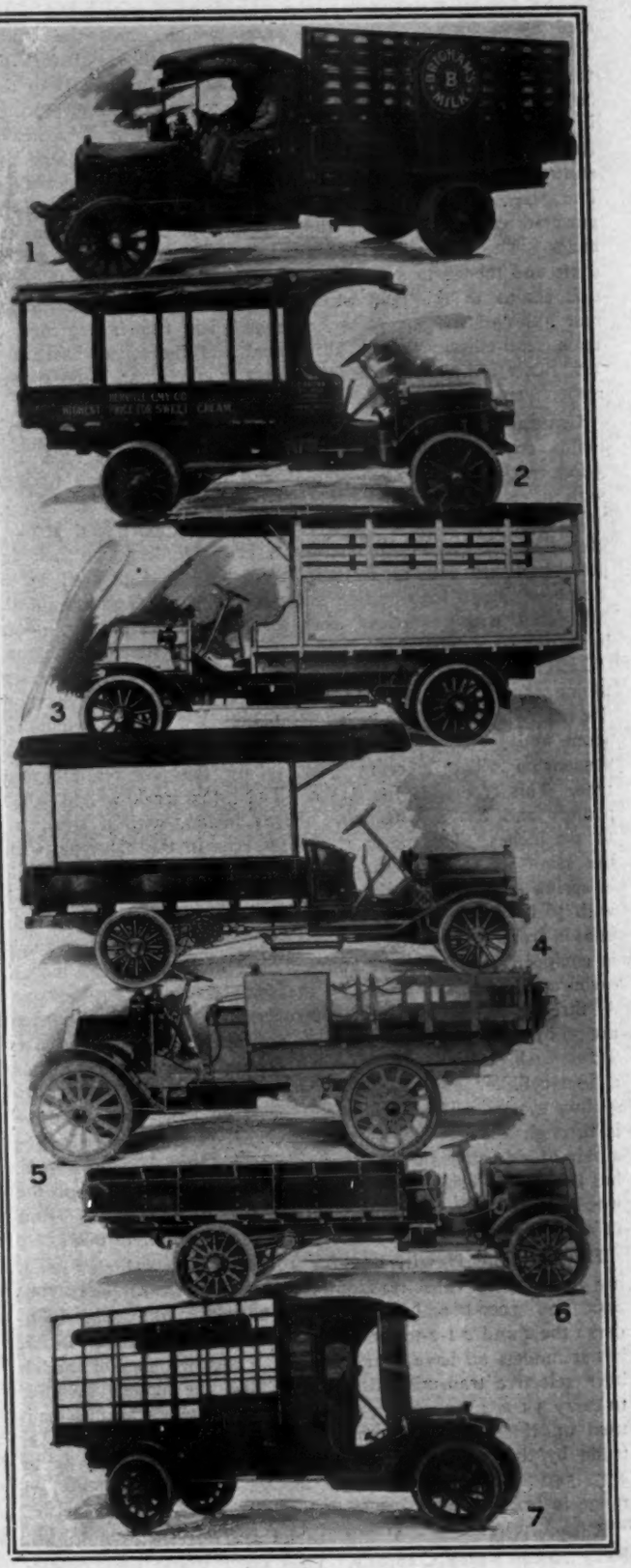
Federal—The Federal Motor Truck Company, of Detroit. is putting out a new 1-ton model for 1912. Two body styles are fitted to the chassis, an open-stake body and one that is inclosed. The price of the chassis is $2,100, body equipment extra. The wheelbase is 110 inches and the overall length is just short of 14 feet. The motor is of the four-cylinder. four-cycle vertical type and is located in the front of the car. Left hand drive has been established. The cylinder measurements are 4 1-2 by 4 1-2 inches and the rated horsepower is 30. The. cylinders are cast in pairs. High tension Bosch ignition with fixed control; Stromberg float carbureter, with governor and accelerator, splash and force-feed lubrication with pump in crankcase; vertical tubular radiator with centrifugal pump and belt-driven fan; cone clutch, leather faced; selective gearset with three forward speeds and drive by side chains are some of the specifications.

Garford—The Garford line is made up of three standard models, namely, the 1 1-2-ton, 3-ton and 5-ton types. On the 1 1-2-ton express truck the motor has 40 horsepower with a bore and stroke of 4 3-4 inches by 5 1-4 inches, the four vertical cylinders being cast in pairs. For this model the wheelbase is 120 inches, the tires are pneumatic and the drive is through a

propeller shaft. In other respects it does not differ from the other two models of higher capacity. The motor size of these latter is 4 1-4 inches by 5 1-4 inches; they are rated at 30 horsepower and have four vertical cylinders cast in one block. On the 1 1-2-ton and 5-ton types there are four speeds forward and reverse, while on the 3-ton model there are three forward speeds. Power is conveyed to the rear wheels of the 3-ton and 5-ton trucks through counter-shaft and side chains and they have solid tires. Double wheels are put on all models and all have pressed steel channel section frames. Specially designed carbureters are used on all models. On the 1 1-2-ton type the service brake is contracting and acts on the rear wheels, while on the other two it acts on the transmission. The prices of the three models are $2,800, $3,400 and $4,500, respectively. The standard body types on the 3-ton and 5-ton trucks are of the stake type, while the 1 1-2-ton one has an express body.

Grabowsky—This concern builds four types of trucks, comprising 1 1-2, 2 and 3-ton carrying capacities. The motors employed in all four types are of the vertical variety and have four cylinders. The horsepowers of the motor are 28.9 for the three smaller cars and 40 for the 3-ton truck. Both motors are of the square type, the smaller being 4 1-2 by 4 1-2 and the larger 5 by 5 inches. The cylinders on both motors are cast in pairs and both are designed to run at 1,000 revolutions a minute when developing the maximum roadway speed. The carbureters employed are of the float-feed type and the gasoline is fed to them by gravity from the tank. The mixture is throttled by means of a lever from the driver's seat. The governor also operates on the throttle. Ignition is by the Bosch dual system, with Bosch high-tension magneto. This is also controlled by means of a lever located on the steering wheel. All the motors made by this concern are lubricated by means of a combination splash and force-feed system. The motor is cooled by water, which is circulated by a centrifugal pump and cooled by means of a honeycomb radiator. This is located to the rear and above the motor. The fan which cools the radiator is driven by means of belting. The clutch is of the disk type faced with Raybestos and steel. The power is controlled by means of a three-speed, selective, sliding gearset which is a unit with the motor. The drive is taken from the gearset and transmitted to a propeller shaft and then by means of side chains to the rear wheels which run upon axles of I-beam section. The wheelbase of the smaller truck is 121 inches, while that of the 3-ton is 145 inches. A larger truck of 5 tons capacity is also built, having a motor with a rated horsepower of 44.1. The bore is 5 1-4 inches and the stroke is 5 3-4 inches. The other specifications of the motor are similar to the smaller types, but are of heavier construction to withstand the heavier weights.

General Motors—Four types of trucks or multiple-passenger machines are built by this concern under the trade name of G. M. C. The line consists of 1-ton, 3 1-2-ton and 5-ton trucks. Three styles of motor are used by this concern in bringing out this line of trucks; these motors measure 3 1-2 by 5 1-4, 4 by 6 and 5 by 5 inches respectively. The larger motor is used on the 3 1-2 and 5-ton trucks, while the other two are used on the two smaller models. The motors are all of the four-cylinder, four-cycle vertical type with the cylinders cast en bloc on the two smaller sizes and in pairs on the larger. The two smaller sizes are rated at 20 and 25 horsepower respectively at 1,100 revolutions a minute, while the larger motor is designed to run at 800 revolutions a minute and develop from 40 to 45 horsepower at that speed. All other motors are fitted with Schebler carbureters to which the gasoline is fed from the tank by gravity. The gas is controlled by a throttle governor. The ignition is also similar on all models, being of the high-tension Bosch dual type, on the smaller two motors and of the Mea type on the large motor. All three are controlled by means of levers on the steering wheels. The lubricating system used is force-feed to the main bearings and splash to all the other bearings in the motor. The oil is recirculated. The



1. Pierce-Arrow 5-ton truck
2. Case express body
3. Motors truck company's express type
4. Knox open stake type
5. Federal with type body
6. Schacht stake body truck
7. White, with stake body

motors are all water-cooled, the circulating system being operated by a bronze centrifugal pump which sends the water through the manifolds and through vertical tube radiators on the two smaller motors and a cellular radiator in the case of the larger model. The smaller radiators are supported on springs in front of the motor, while the larger is hung in a heavy steel frame on three-point suspension. All three motors use multiple disk clutches, the largest being of the Hele-Shaw type. The gearsets are of the four-speed selective type in the lower powered cars and of the three-speed type in the larger vehicles. The power is transmitted in all cases to a propeller shaft and thence to a transverse shaft, where it passes through side chains to the rear wheels which are carried upon dead rear axles of the square section type. The frames are carried upon semi-elliptic springs all around and the wheel bases are 126, 142, 138 and 138 inches for the 1, 2, 3 1-2 and 5-ton trucks respectively. Bodies optional.

Gramm—The Gramm Motor Truck Company, Lima, O., builds four sizes of freight vehicles. The largest type, the 5-ton truck, weighs 7,000 pounds and has a wheelbase of 130 with a tread of 69 or 72 inches. The four-cylinder motor, which is under the driver's seat, has 5-inch bore and stroke, giving 40 S. A. E. horsepower. The cylinders are cast in pairs and are fed by a Rayfield carbureter and fired by a Bosch or Simms high-tension magneto. The cylinders are splash lubricated, with force-feed leads to all bearings; the cooling is by water, circulated by a pump through the tubular radiator. A steel multiple-disk clutch is used with a selective gearset giving four speeds and reverse. The axle is chain driven and the rear wheels carry 40 by 5-inch dual tires. Tires are single in front and 35 by 5 inches. Semi-elliptic springs constitute the suspension. The steering gear is of the differential-screw type. This type sells for $4,500. The 3-ton truck weighs 5,000 pounds and has a wheelbase of 124 inches, with a tread of 67 1-2 inches. The motor is the same as in the big type, with the same accessories, but cooled by a flat tube radiator which is spring supported on the dash. The wooden wheels are shod with 36 by 4-inch dual tires in the rear and single 36 by 5-inch ones in front. The price of the chassis is $3,500. The 2-ton truck is equipped with a square four-cylinder motor of 4 1-2 inches, carbureted, fired and cooled in the same way as the 3-ton size. A three-speed transmission, however, is used, and the tires are 36 by 4 inches in front and 36 by 3 duel in the rear. It costs $2,600 f.o.b. factory. The 1-ton truck sells for $2,000 and has a four-cylinder motor of 4 by 5 inches, cooled by a thermo-syphon system. The cylinders are cast en bloc, and the drive is through a steel disk clutch and three speed transmission, by a pair of side chains to the rear axle. This type, like the others, has the service brake on the jackshaft and the emergency on the wheel hubs. The maximum speeds of all types are: 1-ton, 17 miles an hour; 2-ton, 16; 3-ton, 14.5, and 5-ton, 12 miles.

Hewitt—The Hewitt line for 1912 includes vehicles ranging in carrying capacity from 2,000 pounds to 10 tons. The 2,000 and 3,000-pound models have a motor with four cylinders; the 2 and 2 1-2-ton models are two-cylinder cars, while the larger models all have four cylinders. The two smaller models have selective transmissions, as have also the models designed to carry 3 1-2, 4 1-2 and 5 1-2 tons. The planetary transmission is used on the two-cylinder models and also on the giant cars made by this company. There are three motor sizes, 3.25 by 4.75, 5.50 by 5 and 4.25 by 6 inches respectively. The cars range in price from $1,800 to $5,500.

Kelly—Three sizes of big trucks are put forward by the Kelly Motor Truck Company. They are 1, 2 and 3-ton models. The length of the 2-ton truck is 168 inches; width, 54 inches; wheelbase, 136 inches; maximum speed, 15 miles an hour; motor has four cylinders cast separately, 4.3 by 5.1 inches, rated at 30 horsepower. Breeze carbureter; Bosch ignition, splash and force feed lubrication are supplied. The engine is air cooled. Disk clutch; selective transmission giving four speeds; final drive by chains; Ross steering gear and brakes on rear hubs and jackshaft are some of the main features. The 3-ton car is identical in chassis measurements, the only differences lying in the length of the body.

Knox—The line of the Knox Automobile Company consists of eight models, which include two fire trucks. The carrying capacities of the other six models range from 2 tons to 6 tons. Two of these six, namely, models M-17 and M-18, which are the 5-ton and 6-ton models, respectively, have four-cylinder, 48-horsepower vertical motors with bores and strokes of 5 1-2 inches. The other four—the two 2-ton, 3-ton and 4-ton models—are equipped with 40-horsepower engines of the same type, having 5-inch bores and 4 3-4-inch strokes. Model 8, which is the heavy fire truck with hose body, has a 60-horsepower, six-cylinder motor with a 5-inch bore and a 5 1-2-inch stroke, while the other, which is a combined hose and chemical affair (model M-3), has a 48-horsepower, four-cylinder motor, having a bore and stroke of 5 1-2 inches. The cylinders of all the motors are cast singly, and all are equipped with Stromberg float-feed carbureters. Aside from the differences of length and size of parts, there are practically no other mechanical variations in the chassis of the various models. The power transmission is effected through jackshafts and side chains, and the service brakes contract on the former. Specially designed three-plate clutches are used and there are three forward speeds and reverse. Selective sliding-gear transmissions are used and the gear boxes are located on the jackshafts in all models except the 2-ton cars, which have them in unit with their motors. Dual solid tires are placed on the rear wheels of all models, and the rear axles are of the dead round type. On the commercial trucks, bodies can be had to meet all requirements, while on the fire trucks are bodies and equipment designed to meet all needs of the service for which they are constructed. All frames are of structural steel, trussed, and all springs are semi-elliptic. The wheelbases are as follows: Model R-5, 2 tons, 103 inches; model R-3, 2 tons, 145 inches; model M-3, hose and chemical, 145 inches; model 8, fire pump, 170 inches; model R-15, 3 tons, 149 inches; model R-16, 4 tons, 149 inches; model M-17, 5 tons, 149 inches; model M-18, 6 tons, 149 inches. The usual truck equipments are included.

Lauth-Juergens—The Lauth-Juergens Motor Car Company, of Fremont, O., builds its products in three sizes, 3, 2 and 1-ton. Excepting the last, the stake body is standard equipment, while the 1-ton is fitted with an express type of body. The 3-ton truck has a wheelbase of 20 inches, 62 3-4 inches tread, four cylinders 4 3-4 by 5 inches, which are connected to the four-speed gearset by a three-piece disk clutch. Force-feed and splash lubrication are combined in the motor, and carburetion and ignition systems are of standard makes. The drive to the rear axle is by two chains from the jackshaft, which carries the emergency brake, while the service brakes act on the rear wheel drums. The tires are all 38 inches in diameter, with 5-inch section in front and 4 inches in the rear, where they are in dual arrangement. They are optional either solid or Diamond make. Price, $3,200 for the chassis. The 2-ton truck has 58 inches tread. The motor is 4 1-2 by 5 inches and designed along the same lines as in the big truck. Tires are 36 by 4 inches in front and 36 by 5 inches dual in the rear, with option between Diamond and solids. The price of the chassis is $2,700. The 1-ton truck is made in two models. One has 104 inches wheelbase and 56 inches tread. The four water-cooled cylinders are 4 by 4 inches. Clutch and transmission are the same as in the other types. Goodyear solid tires, 36 by 3 1-2, are used in front, and 36 by 4's in the rear. The chassis sells for $1,950. The other 1-ton truck has a square 5-inch motor of two cylinders with a Schebler instead of a Rayfield carbureter and a Detroit oiler. Ignition is Bosch, as on the other types. The method of driving is as on the big trucks. The tires are solid Diamonds, 32 by 3 inches in front and 32 by 3 1-2 inches in the rear. The chassis sells for $1,650. Semi-

elliptic springs are used, with lengths and widths as follows: 3-ton, 42 by 3 inches in front, 52 by 3 1-2 inches rear; 2-ton, 42 by 3 1-2 and 52 by 3 inches; 1-ton, 40 by 2 1-2 and 48 by 2 1-2 inches.

Lipard-Stewart—A 1,500-pound panel wagon characterizes the line of this concern. It is equipped with a motor of the four-cylinder, four-cycle type, rated at 22 horsepower and giving the vehicle a maximum road speed of 25 miles an hour. The bore of the motor is 3 3-8 inches and the stroke 5 5-16 inches. The four cylinders are cast en bloc and the motor is designed to run at 1,200 revolutions a minute. A float-feed carbureter is used and the flow of the fuel to it is by gravity. The mixture is throttled by lever on the steering wheel. Bosch high tension magneto and constant level oiling form the methods of ignition and lubrication of the motor. The water, by means of which the motor is cooled, is circulated by the thermo-syphon system through the honeycomb radiator located on the dash and cooled by the fan formed by the blades of the fly-wheel. The clutch is of the type faced with steel and Raybestos. The gearset is of the three-speed selective type located in the center. The drive is of the shaft type, which delivers the power to a floating rear axle. The wheelbase of the car is 115 inches and the tread is 56 inches.

Locomobile—This car equiped with any type of body desired fitted to the standard chassis, has a four-cylinder, four-cycle motor of 45 horsepower with the cylinders cast in pairs. The motor is of the vertical, T-head type located beneath the driver's seat. The motor is oiled by a circulating splash system with feeds to the cylinders, crankshaft bearings and timing gears. The capacity of the oil reservoir and system is 2 7-8 gallons. The motor is cooled by water, the circulation being maintained by a pump of the centrifugal type. The water is forced through the jackets and through a radiator of the honeycomb type, cooled by a belt-driven fan. The ignition of the motor is of the high tension variety, operated by a Bosch magneto and batteries to start. The spark control is fixed and automatic. The carbureter employed is manufactured by the Locomobile and the feed of fuel to the carbureter is by gravity. The dry disk clutch is faced with steel against non-burning fabric, through which the power of the motor is passed to the gearset, which allows of four forward and one reverse speed; the maximum being 8.5 miles per hour on fourth speed. The power transmission is through radius rods and chains to the rear wheels, which are supported by fixed rear axles. The wheelbase of the truck is 140 inches and the tread 70 inches.

Lozier—Entering the commercial vehicle field for the first time, the Lozier Motor Company introduces itself with a 5-ton truck. The total length of the car is 18 feet 7 inches. The motor is of four cylinders, cast in pairs of the L-head type, measuring 4 1-4 by 6 1-2 inches and rating at 35 horsepower. The motor is located under the seat. Lubrication is by gear driven pump with splash to cylinders and main bearings. The engine is water cooled. High tension dual ignition. A multiple disk clutch, steel against steel; selective gearset giving four forward speeds, developing a maximum of 13 miles an hour on high. The drive is by double side chains. The wheelbase is 134 inches. The cost of the chassis is $4,800. The company is also putting out a 4-ton truck.

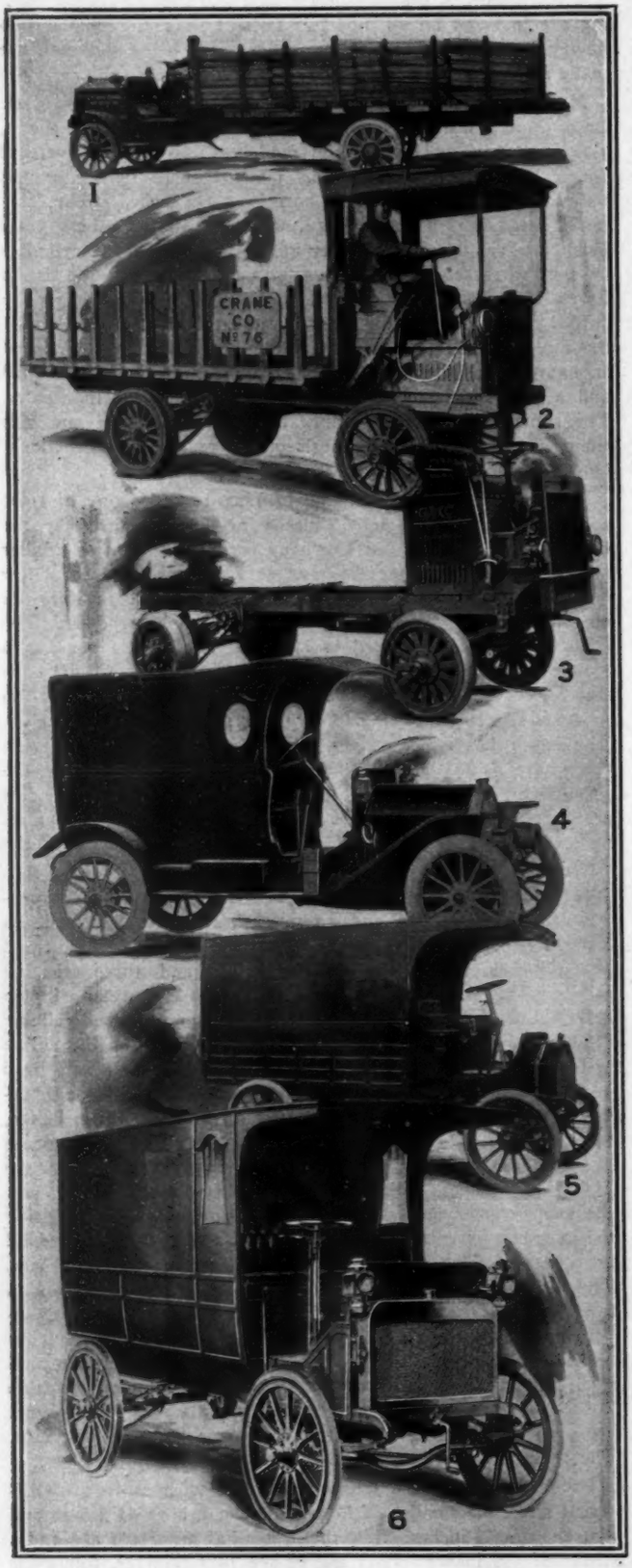
McIntyre—The McIntyre line for 1912 consists of six models of 800, 1,500, 2,000, 3,000, 4,000 and 6,000 pounds carrying capacity. The three lighter vehicles are equipped with two-cylinder horizontal opposed motors, having cylinder dimensions of 4 1-8 inches by 3 3-4 inches, 5 1-4 inches by 4 inches and 5 1-4 inches by 4 3-4 inches respectively. For the 3,000 pound truck, the motor is four-cylinder, vertical machine, having a 4 1-8-inch bore and a 4 3-4-inch stroke, and its cylinders cast in pairs, while a 4 1-8 inch by 5 1-4-inch four-cylinder vertical monoblock motor is used for the two cars of highest capacity. On the 800, 1,500, 2,000 and 3,000-pound cars, planetary transmission in unit with the jackshaft is used, while on the 4,000 and 6,000-pound trucks a three-speed selective type in unit with the motor is constructed. A multiple-disk clutch and thermo-syphon cooling are included on all models. These trucks, the smaller two having delivery bodies and the other types being optional, are made at Auburn, Ind., by the W. H. McIntyre Co.

Mack—Trucks of seven capacities compose the Mack Bros. Motor Car Company line for 1912. These are the 1, 1-2, 2, 3, 4, 5, and 7 1-2- ton models. Two sizes of vertical four-cylinder motors are used. On the three lighter models the motor size is 4 1-2 inches bore by 5 1-2 inches stroke, giving a rated horsepower of 32.4, while on all the others 5 1-2 inch by 6-inch, 48.4 horsepower motors are used. The cylinders of both these motors are cast in pairs. The ignition is by Bosch high tension dual system, and the lubrication is by forced feed. On the 1, 1 1-2 and 2-ton trucks, the clutch is of the multiple disk type, while on the heavier vehicles, it is of an improved cone type. All models have three speeds forward and a reverse, the control levers being located in the center. The transmission system makes use of a jack-shaft and side chains and there are twin wheels on the rear of all the models. On all the Mack vehicles the body types are optional.

Modern—Three models; one of 1,000 pounds; one of 1,500 pounds and one of 2 tons capacity are manufactured by the Bowling Green Motor Car Company for 1912. The two smaller models are similar in every way save for size and in a few details. The big car is different. The small cars have en bloc motors, respectively rated at 22 and 30 horsepower. The cylinders are water cooled in all models. The big car has a Hele-Shaw clutch, while the others are fitted with special cone clutches. The drive is by side chains. The motor of the 2-ton model is also en bloc, being four cylinders of 4 1-8 by 5 1-4 inches. The motor has 2-inch valves, which are inclosed. The chassis prices are $1,200 for the 1,000-pound vehicle, $1,600 for the 1,500-pound car and $2,600 for the 2-ton truck. Stake bodies are furnished at these prices with the smaller models, but an additional $250 is charged for that variety of body with the 2-ton truck.

Morgan—The Morgan Motor Truck Company, of Worcester, Mass., builds 5, 3 and 2-ton trucks. Bodies are made to order. The 5-ton truck has a wheelbase of 144 inches, tread of 64 inches, four 5 by 5-inch cylinders and three selective speeds. The motor is a block casting, with carbureter of own make, U. & H. magneto and water cooling by pump and cellular radiator. Force feed and splash are combined in the oiling system. The drive to the axle is by chain; solid tires 36 by 6 in front. The service brake acts on the jackshaft and the emergency brakes on the drums of the rear wheels. Price, $4,750, f.o.b. factory. The 3-ton truck costs $3,500 and has a wheelbase of 127 and a tread of 63 inches. The monobloc cylinders are 4 5-8 by 5 inches, with the equipment as outlined above, and the same copper and stel disk clutch running in oil to drive the gearset. Tires are 34 by 5 in front and 34 by 4 dual solid in the rear. The brakes are arranged as in the 5-ton size. The 2-ton truck, which has a wheelbase of 113 inches and a tread of 62 inches, sells for $3,000. The four monobloc cylinders have a bore of 4 1-2 by a stroke of 5 1-2 inches and are served and cooled as in the other types. A bronze and steel clutch is used; the transmission and its location amidship are the same as in the bigger trucks. Tires are single all around, being 34 by 4 inches in front and 35 by 4 inches in the rear. The spring suspension is semi-elliptic, as in the other types.

Packard—These two trucks are fitted with motors of different sizes, the smaller of he two having a bore of 4 1-16 and a stroke of 5⅜ inches, while the larger has a bore of 4½ and a stroke of 5½ inches. Both are of the four-cylinder, four-cycle type with the cylinders cast in pairs. The horsepower ratings, according to the S. A. E. formula, are 26 and 32 respectively. The smaller motor is designed to run at 1,200 revolutions a minute at a road speed of 14 miles an hour, while the larger is designed to run at 1,000 revolutions a minute and to develop a maximum speed of 12 miles an hour. The carbure-



1. Packard lumber wagon
2. Alco lumber wagon
3. General Motors truck chassis
4. Stoddard 20 delivery wagon
5. Gramm delivery wagon
6. Cartercar delivery wagon

ters employed by this concern on all motors are of the Packard float feed type, to which the fuel is fed by gravity. The throttle is controlled by a lever on the steering wheel as well as by means of a governor. The ignition is of the high tension type with Eisemann magneto, while the lubrication is by means of the splash system with pump feed to the crankcase. The motors are cooled by water, which is circulated by means of a centrifugal pump. This forces the water through the manifolds and through a radiator of the cellular type cooled by a belt-driven fan. The clutch is of the Packard dry plate type faced with asbestos material and steel. The gearset is a selective, sliding, three-speed unit, through which the power is transmitted to a propeller shaft and thence to a countershaft, where the drive is taken up by side chains to the rear wheels, which are supported upon dead rear axles of square section. The wheelbase of the smaller vehicle is 120 inches and the tread 63 inches, while the wheelbase of the larger car is 144 inches and the tread 68 inches. Both bodies are of the platform type.

Packers—A 3 1-2 and a 2-ton truck are offered by the Packers Motor Truck Company, of Wheeling, W. Va. The big type has a wheelbase of 150 and a tread of either 60 or 62 1-2 inches; the four cylinders, having a rating of 50 horsepower, have a bore of 5 1-4 and a stroke of 6 inches. They are water-cooled by a centrifugal pump and vertical tube radiator, and a Hele-Shaw clutch is used together with a three-speed selective gearset. Chain drive is used. Tires are 36 by 5 inches, solid all around, being dual in the rear; service and emergency brakes are located on jackshaft and in rear wheel drums respectively. The chassis sells for $3,900. The 2-ton truck costs $2,500 and has a 4 1-2-inch square motor with the same equipment and same kind of drive as the big size. The tire sizes are 36 by 3 1-2 inches in front and 36 by 5 inches in the rear Wheelbase is 130 inches.

Peerless—The Peerless Motor Car Company will put out commercial cars this year having carrying capacities of 3, 4 and 5 tons, the chassis of all having the same mechanical details of construction. The bodies are optional, and a standard motor is used with all models. It is a four-cylinder vertical motor, having the cylinders cast in pairs, and with dimensions of 4 1-2 inches by 6 1-2 inches. Cone clutch, gear-driven water pump, selective four-speed drive and splash lubrication are standard features of all models. Control levers are placed in the center. The power is transmitted through countershaft and side chains. The motors are equipped with Peerless float-feed carbureters and the fuel is supplied by gravity. The service brakes are located on the jackshaft and are of the band type, while the emergency brakes are of the ordinary expanding type. The wheelbases are of two lengths, namely 151 inches and 174 inches.

Philadelphia—This line of commercial cars, which is produced by the Standard Gas & Electric Power Company, Philadelphia, is made up of two models, model D with a capacity of 1,500 pounds, and model B of 6,000 pounds capacity. The motor of the former has a size of 3 5-8 by 4 3-4 inches, is rated at 25 horsepower and has four vertical cylinders cast in pairs. On the latter model the motor is similar to the other except in size, which is 4 1-4 inches by 4 1-2 inches, giving it 30 horsepower. Also on model B there is an electric motor, so that the power, which is furnished to the countershaft and side chains is the combined power from this and the gas motor. Pneumatic tires are the equipment on model D, while solid are placed on model B. Both models are fully equipped, including electric lights and self-starters.

Pierce-Arrow—Another worm-driven truck is presented by the Pierce-Arrow Motor Car Company, of Buffalo. It is of 5 tons carrying capacity. The wheelbase is 13 feet, tread 69 inches, and the car turns on a radius of 26 feet. The maximum speed is 13 miles an hour. The motor has four cylinders of 4 7-8 by 6 inches, rated at 38 horsepower, and is of the water-cooled, four-cycle type. Like all Pierce-Arrow cars, the motor is in front. The drive is from the right side. A Pierce-Arrow

carbureter of the automatic float-feed variety with fuel feed by gravity, controlled by steering-wheel lever; Bosch ignition, hand controlled; gravity lubrication direct to crankshaft bearings with return to tank over motor; cone clutch; selective, sliding gears, giving three forward speeds and reverse; floating rear axle; Pierce-Arrow steering gear and brakes on transmission and rear hub drums are some of the features.

Pope-Hartford—The Pope Manufacturing Company, of Hartford, Conn., comes forth with a 3-ton truck. The two pairs of cylinders are rated at 40 horsepower, the carbureter is the factory's own make, while a Bosch magneto is used for firing the charges and the lubrication is by splash. It is water-cooled and through a cone clutch actuates the three-speed selective transmission, the final drive being by two side chains. Semi-elliptic springs are used all over, with a cross spring in the rear; tires are solid, 36 by 5 in front and dual 36 by 4 in the rear. The wheelbase is 126 inches long and the tread is 68 inches. With standard equipment the truck sells for $3,400, the stripped chassis being listed at $3,250.

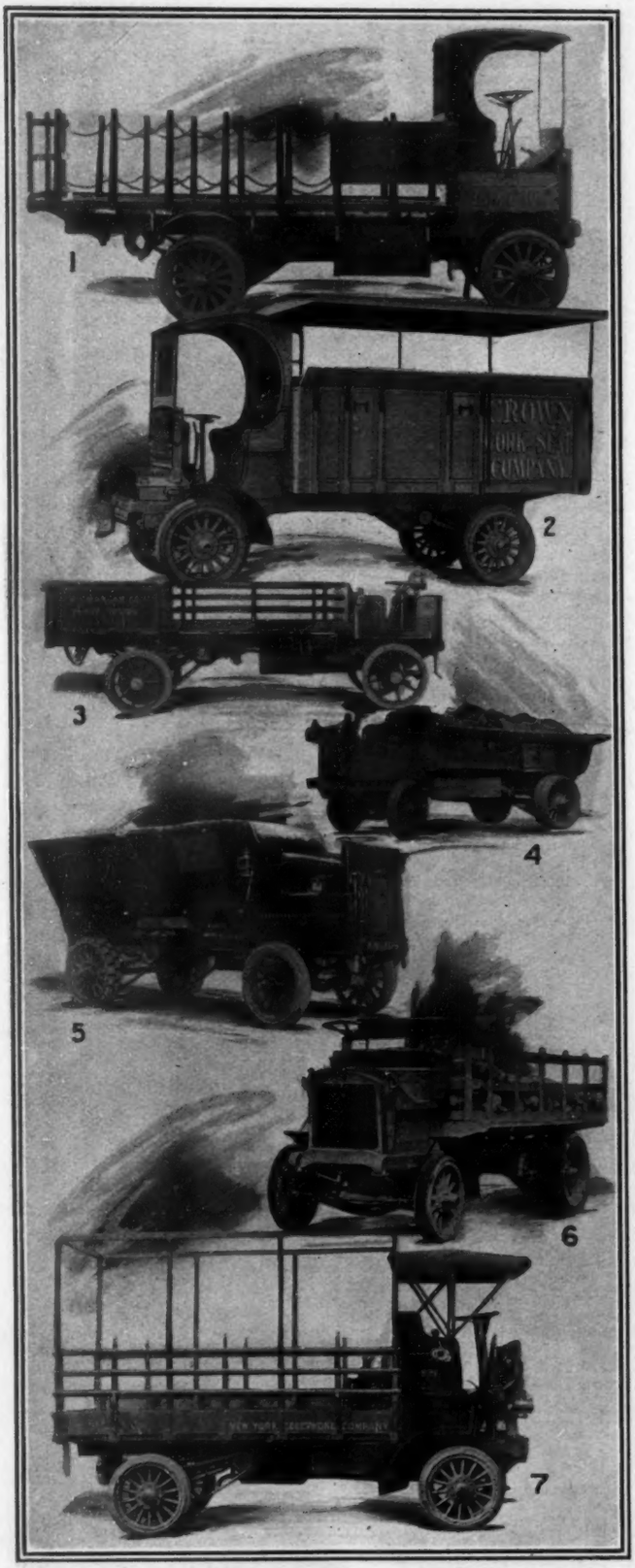
Reo—One small delivery car with a rated carrying capacity of 500 pounds and a 1,500-pound truck are the chief offerings of the Reo for 1912 in the line of commercials. The delivery model is equipped with a single-cylinder motor 4.7 by 6 inches, rated at 12 horsepower. Planetary transmission and all the features of last year are carried along in the 1912 line.

Sampson—Four trucks represent the line brought out by the Alden Sampson Mfg. Company. The smallest is a 1,500-pound shaft-drive wagon, equipped with a 4¾ by 4¾-inch, 18-horsepower motor, and the largest is a 5-ton truck equipped with a motor of 40 horsepower and having a bore and stroke of 5 and 5½ inches respectively. The other two trucks are also of the chain-driven type and are 4 by 5 and 4½ by 5½ inches, with ratings of 25 and 33 horsepower respectively. The smallest motor has two singly-cast cylinders, while all the others are motors of four cylinders, cast in pairs. The motors are all water-cooled, the circulation being maintained by the thermo-syphon system which takes the water through vertical tube radiators. There is no fan fitted to the small two-cylinder motor. On the 1,500-pound wagon the clutch is of the dry plate type; on the 1½-ton truck and the 3-ton truck it is of the multiple disk type, while on the 5-ton truck it is of the cone type with cork inserts. The gearset on all the cars is of the selective sliding type, being three speed and reverse on the three smaller types and four speed and reverse on the 5-ton truck. The 1,500-pound wagon is the only live axle car made by this concern, the other cars all being driven by countershaft and chains in cases, the drive being taken up by the rear wheels on dead axles of square section on all except the 5-ton truck, on which the axle is of square section. The wheelbases of the cars are 94, 110, 144 and 155 inches for the 1,500-pound, 1½-ton, 3-ton and 5-ton trucks respectively, while the treads are 56, 58, 70 and 72 inches, according to the size of the car. Bodies optional.

Sanford—A three-cylinder, two-cycle truck of 1-ton carrying capacity and known as model J is offered by the Sanford-Herbert Company, of Syracuse, N. Y. The car is made in several body styles. The wheelbase is 88 inches with standard tread. The car makes a maximum of 15 miles an hour and, with cylinders measuring 4 by 4 1-2 inches, rates at 20 horsepower. A Holley carbureter with gravity feed and steering wheel control; Bosch ignition, fixed control; lubrication by splash and oil mixed with the gasoline; air cooling with belt-driven fan; cone clutch; planetary or selective transmission, the latter being extra in cost, and double chain drive from countershaft to dead, rectangular-section axle; tires 36 by 3 inches and Brown-Lipe steering gear are included among the specifications.

Schacht—Trucks of two capacities, 1,500 pounds and 3 tons, make up the commercial vehicle line of the Schacht Motor Car Company, Cincinnati, O., for 1912. These are models D-4 and 19, respectively. The motors used have the same stroke length of 5 inches, while the D-4 motor has a bore of 4 5-16

1. Sloping-hood chassis fitted with ambulance body
2. Sampson light delivery wagon
3. Hewitt truck fitted with full express body
4. Commer truck with large van body
5. McIntyre light express wagon, chain drive
6. Veerac light delivery wagon with chain drive



1. Pope-Hartford with stake body
2. Grabowsky panel truck with top
3. Morgan truck with express body
4. Gramm truck with panel body and flare boards
5. Knickerbocker tilt-up coal wagon
6. Lozier platform truck with express body
7. Express-bodied Mack with superstructure

inches and the model 19, a bore of 4 1-2 inches. The former is rated at 40 horsepower and the latter at 45. Both are of the four-cylinder, vertical type and have their cylinders cast in one block. For the heavier model dual magneto ignition is included, while single magneto ignition is part of the regular equipment of the other model. The motors are lubricated by plunger pumps located in the crankcases, while positive water circulation is effected by gear-driven centrifugal pumps. On both chassis three-speed selective gearsets are located in the center. On the lighter model a propeller shaft is used for power transmission, while on the model 19 countershaft and side chains are made use of. Also, the rear axle of the former is of the semi-floating type and on the latter it is dead. Pneumatic tires are placed on the model D-4, while on the other solid tires (rear double) are used.

Speedwell—Two big trucks, Model Z, of 8,000 pounds capacity, and X of 12,000 pounds, are presented by the Speedwell Motor Car Company, of Dayton, O. The wheelbase of model Z is 115 inches but the loading space is 12 1-2 feet and the overall length of the vehicle is 18 2-3 feet. The motor is of four-cylinder, four-cycle type and the cylinders measure 5 inches square, rating at 40 horsepower. The maximum speed is 12 miles an hour. Left-hand drive and center control are introduced. The 6-ton vehicle has a wheelbase of 139 inches, with overall length of 21 2-3 feet. Save for a difference of 1 inch in tread, the larger car having 65 inches, and a difference of 1-2 inch in the thickness of the tires, the smaller car being equipped with 36 by 5 tires all around, the models are identical. Schebler carbureter; Eisemann ignition with automatic advance; lubrication by forced feed, using a gear-driven pump with splash to rods and bearings; honeycomb radiation located in front on the main frame are some of the mechanical details.

Stearns—This truck is regularly fitted with a platform type of body although other styles may be furnished at an extra charge. The motor is of the four-cylinder, four-cycle type with the cylinders cast singly. The bore is 4 3-4 inches and the stroke 6 inches, giving a rated horsepower of 44.1 at 1,200 revolutions a minute and a vehicle speed of 15 miles an hour. The carbureter used is the Stromberg float-feed to which the fuel is fed by gravity and which is controlled by a lever on the steering wheel and by a foot accelerator. The Bosch dual system of ignition is used and the force-feed lubrication system. The motor is water-cooled, the circulation used being by means of a centrifugal pump and the radiator being of the honeycomb variety, mounted in the front of the vehicle. The clutch is of the dry-disk type, faced with steel and Raybestos, and delivering the motive power to a selective gearset of four speeds located in the center of the car. The drive is taken up by chains to the wheels, which are held by a dead rear axle of the square type. The wheelbase of the car is 144 inches and the tread 63 1-2 inches.

Sternberg—Two Sternberg truck models are produced by the Sternberg Mfg. Company for this year. They are the 1 to 1 1-2-ton and the 2-ton models. The motors for both models are four-cylinder, vertical; that for the former having cylinder dimensions of 4 1-8 inches by 5 1-4 inches and 30 rated horsepower, while the latter's engine has 35 horsepower, a bore of 4 1-4 inches and a stroke of 5 inches. Ignition is accomplished by the Eisemann automatic-advance dual system. The clutch is of the multiple V-shaped disk type, there being alternate bronze and steel plates. The transmission is of a special individual-clutch type, the gears being always in mesh. There are three forward speeds, and the drive is by means of side chains. On the lighter truck the rear axle is floating, while on the other model it is dead. The frames are of pressed steel channel section, wood inlaid. The standard body types are either stake or box flare, although any form of body is optional.

Sullivan—Rochester, N. Y., is the home of the Sullivan Motor Car Company. Its product is equipped with a 4 1-2-inch square motor, having a Schebler carbureter and Bosch magneto.

and being thermo-syphon cooled. Steel cone clutch and two-speed planetary drive the jackshaft, the final drive being by means of double chains. The wooden wheels are equipped with 36 by 2 1-2-inch solid tires all around, and full-elliptic springs are used all over. The wheelbase is 92 inches on the 1,000-pound wagon, and 92 or 110 optional on the 1,500-pound wagon.

Universal—This year's model of the Universal Motor Truck Company, Detroit, Mich., is of the 3-ton type and regularly furnished with a platform body. The 4 by 5 1-2-inch motor is served by a Rayfield carbureter and Bosch magneto, the lubrication being by splash and cooling by pump and cellular radiator. Plate clutch and three-speed selective transmission are used, and drive to the dead axle is by two chains. Solid tires, 36 by 5 in front and dual 36 by 4 in the rear, are used, with the wheel-drums holding the emergency brakes, while the contracting foot brake is on the countershaft. The wheelbase is 131 inches, the tread 68 inches, the weight 6,500 pounds

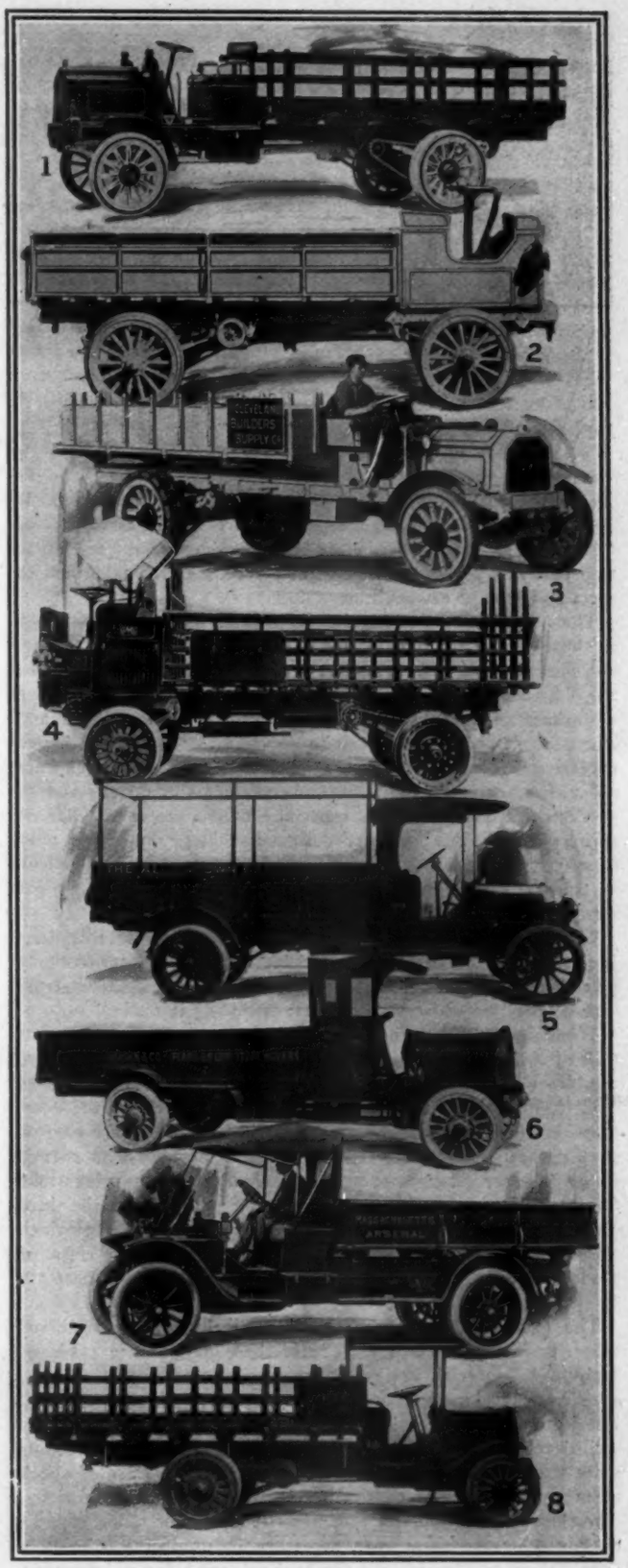
Veerac—The Veerac Motor Company, of Anoka, Minn., comes to the front with a 1,500-pound wagon. It is short, having a wheelbase of 82 inches and a tread of 56 inches, and with an express body weighs 1,900 pounds. Two horizontal cylinders constitute the motor, which is 4 by 4 inches and air-cooled by vanes on the flywheel. Multiple-disk clutch, planetary transmission for two speeds, a jackshaft and a dead rear axle complete the running gear, the chassis being of wood-covered angle steel carried by semi-elliptic springs in front and full-elliptics in the rear.

Velie—The Velie Motor Vehicle Company turns out two trucks rated at 1 1-2 and 3 tons respectively, but having the same size of power plant. Carbureter and magneto are of the same make on both types, and honeycomb radiator and pump are used on both. The drive is taken through a bronze-steel clutch faced with cork inserts, to a three-speed transmission located on a subframe amidship, the final drive being by a double chain to the dead axle. The springs are semi-elliptic, 40 by 2 1-2 inches in front, and 48 by 3 inches in the rear. Tires are 36 by 5 in front and 40 by 5, dual, in the rear. On the 3-ton type and on the 1 1-2-ton size springs are the same, while the tires are 36 inches in diameter and have 3-inch section in front and 3 1-2 inches, dual, in the rear.

Walter—The Walter Motor Truck Company offers four types this year. The 5-ton truck has a wheelbase of 154 inches with the tread optional at 58 or 62 inches. Four 4 1-2 by 6-inch cylinders are equipped with Stromberg carbureter and Bosch magneto, water-cooled by a pump and cellular radiator. The clutch is an expansion cone, faced with camels' hair and the gearset gives three selective speeds. The side chains drive a dead rear axle on which the foot brakes are stationed. Tires are 36 by 5 in front and 42 by 5, dual, in the rear. A four-cylinder, 4 by 5-inch, motor is used on the 3 1-2-ton, 3-ton and 1 1-2 to 2-ton trucks. Cooling and ignition, as well as lubrication and carburetion, are identical with those in the big type, and the same system of transmission and drive is adhered to.

White—Two types of trucks are emphasized by The White Company for 1912. The first is a wagon of 1,500 pounds capacity, rated at 30 horsepower, and the other is a 3-ton truck equipped with the same sized engine. The wheelbase of the smaller car is 120 inches; tread standard; while that of the other model is 144 inches with a tread of 65 inches. The difference in chassis length and the increased size of the loading platform in the 3-ton type are the main variations to be noted in construction. The 3-ton model is chain drive, the emergency brakes being on the jackshaft while the smaller car is shaft driven with both sets of brakes on the driving hubs.

CORRECTION—In the issue of January 4, the captions under the runabouts illustrated on page 65 were confused in the printing establishment. The order should have been: National, Pope-Hartford, Elmore, Velie, Cartercar, Marquette, Stoddard-Knight, Imperial, Cole.



1. Packard 3-ton truck
2. Dayton with panel body
3. Peerless truck with long body
4. General Motors truck with express body
5. Mack truck with long stakes
6. Atterbury truck for heavy carting
7. White commercial vehicle
8. Velie with express body

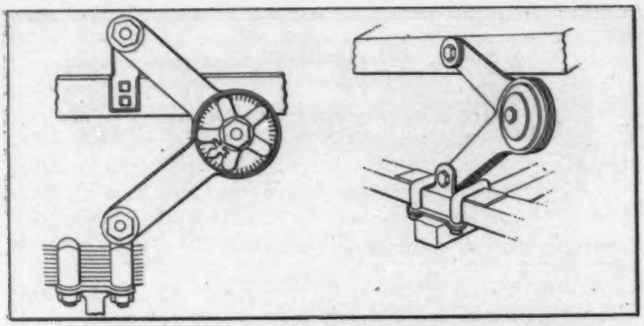


Fig. 1—Hartford-Truffault absorber. Fig. 2—Mondex shock preventer

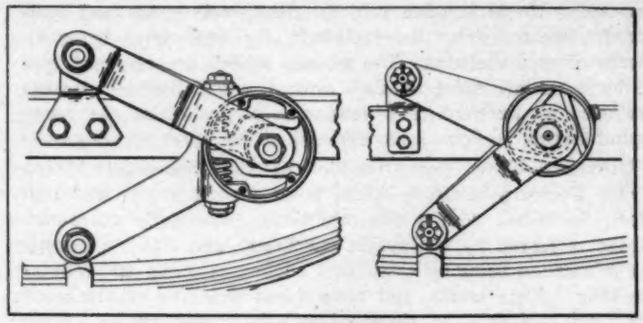


Fig. 3—Peerless combination absorber. Fig. 4—Connecticut scissors type

Review of the Shock Absorber Field

IN modern automobiles easy riding qualities are desired chiefly to provide a fair measure of comfort for the occupants of the pleasure car, or, in the case of commercial vehicles, to transport heavy loads at considerable speeds with a minimum of wear and tear to the machine.

The automobile was originally equipped with springs similar to those used on carriages, but it was soon found that the requirements of the new situation were very much unlike those of the old one. The great speed of horseless vehicles created more vibrations and shocks on the road, and while the shape and strength of the springs could be developed to a certain degree excessive deformations and consequent breakages of springs were not unfrequent. To limit the movement of the springs and to check their recoil, which is especially dangerous to the life of springs, special devices were designed. These are either auxiliary springs or they comprise a mechanism in which the shock is transformed into friction or absorbed by forcing a fluid through narrow passages.

The shock absorber is a characteristic accessory of this time. It makes directly for comfort, and indirectly for greater economy by reducing the stresses that tend to destroy the molecular structure of the material of which the automobile is made.

While it is yet too early to decide as to the most efficacious type of shock absorber on the market, it may be stated that there are practically three types. One contains the fluid-resistance devices, in which the impact of shock is absorbed by the compression of air or the forcing of a liquid through a very narrow passage, and the gradual return of the apparatus to its normal state. The second class comprises devices in which springs take the place of compressible or incompressible fluid, while the third class comprises friction devices of all sorts, several of which are assisted in their action by springs. The spring class of absorbers contains the largest number of types because these are comparatively easy and cheap to produce.

The first class of shock preventers, including the frictional types, is favored by many, because these devices are made of high-grade material, are moderately priced, require hardly any attention, and, last but not least, are practically foolproof. This last feature, while it resides, to some degree, in all types, is very well developed in the friction apparatuses, and this fact accounts more than any other for the introduction of this class of shock absorber on a number of stop products of automobile factories. The third class comprises the minority of types. This may be explained by the great care necessary in producing absolutely right fitting parts, with the fits to hold good for a long time.

Friction-Type Absorbers

The Truffault-Hartford shock absorber, Fig. 1, consists of a double arm connected to the spring and carrying at the other end two steel cup washers and a single arm attached to the chassis frame, which ends in a wood-fiber plate working between the two steel cup washers. The fiber plate is impregnated with oil and self-lubricating; fiber plate and steel washers are contained in a dustproof casing, through the center of which passes an adjusting bolt for keeping washers and plate in frictional engagement. An adjustment nut is set at the end of the bolt and carries an arrow which turns on an indicating dial if the adjustment nut is turned. A compensating spider spring on the dial side of the apparatus takes up whatever wear may occur in course of time. The parts holding the arms to spring and chassis respectively are friction joints in themselves, so that in this device shock is transformed into friction at three points. This year's design is identical with that of 1911 save for a stop on the dial limiting the movement of the arrow to one full circle and keeping the friction within its correct limits. Another improvement lies in the use of a specially long end bearing. The apparatus is made by the Hartford Suspension Company, of Jersey City, N. J.

Other Friction Scissors Types

The Mondex shock preventer of the Aristos Company, New York City, is also of the scissors type; the single movable arm working between a double arm is attached to the frame, while the double arm is held to the spring. The two members of the double arm end in two high carbon steel plates carrying six inclined planes forming three hills, each one having a steep and a gradual incline. The single arm is faced with two firm and resilient rubber disks, Fig. 2, carrying such hills as the steel plates, but in such an arrangement as to cause them to engage the steel inclines. When the two arms are in their relatively normal position there is a free point relation obtaining between steel and rubber inclines, so that a movement of the inclined planes though a little angle is permissible. But a severe shock forces the rubber and steel inclines into wedging engagement, and as there are two series of inclines the following relations obtain: If the car strikes a bump the more gradually inclined planes are brought into wedging engagement, with the short and steep planes engaging on the recoil. The opposite course of events takes place when a thank-you-ma'am is encountered. The two steel plates are held together by a bolt passing through their center and a lock nut permitting of adjusting the pressure of one plane upon the other. The free point afforded to the movable arm in normal position permits of a certain amount of vibration being taken up without noticeable resistance, whereas a real shock is readily absorbed. Between the steel planes and the casing plates a layer of rubber is interposed, which takes up the great and small shocks.

The shock absorber of the Westen Manufacturing Company, Newark, N. J., is continued without radical changes for this season. It is similar to the preceding types, but has inclinations of varying degree, which resulted in its being named the Two-Degree friction type. The lesser degree of resistance thereby

provided checks the ordinary sort of vibration as well as the small shocks which are experienced in riding over the average road, whereas the greater degree is a resistance four-fifths in excess of the lesser one, taking care of the big shocks and preserving the springs. The face of the absorbing mechanism has a dial and adjusting hand, which is used to adjust the shock absorber when it is first installed on a car. In this process only the weight of the car has to be considered, and no adjustment is needed after the first one.

Spring-Type Absorbers

The Detroit spring equalizer, Fig. 8, which is handled in the East by the Post & Lester Company, Hartford, Conn., is attached to the long spring leaves. It is seen in place on a double spring in Fig. 8, showing the construction of the equalizer in detail. It consists of two straps holding two rings together, each of which is attached to one of the springs. One of the rings, or rather ring plates, carries a strong coiled spring wound about a steel cable having a steel button on the top. In the normal position the straps are loose, permitting of a certain play of the springs. If the car strikes a bump, the springs are brought to approach each other, but the coiled spring with its button keeps them from getting too near or contacting, so that the leaves cannot break. On the other hand, if the car drops into a hole for a second or so the straps keep the springs from taking on too round a position and breaking their long leaves.

The Acme Torsion Spring Company, Boston, Mass., also manufactures a sort of auxiliary spring specially coiled so as to link the two shackle bolts of a spring and to absorb the vibration. In this way this construction, Fig. 6, protects the spring and prolongs its life, though it is not a shock absorber in the sense of the types before described.

Its principle somewhat resembles the Ideal shock absorber of the American Sales Company, Detroit, Mich., which is shown in Fig. 7. This device simply consists of a strong spring bent to form an almost circular loop, the material of which it is made being a highly elastic steel. This leaves a short rod end and a long one, the former being secured to the spring and the larger to a steel loop attached to the chassis frame. Normally the two rod ends are almost parallel, but if an up- or down-throw brings them out of this position the coil takes up the thrust without transmitting it to the chassis and body of the car.

The Velvet auxiliary springs, made by John W. Blackledge Manufacturing Company, of Chicago, Ill., without material changes in last year's design, are illustrated in Fig. 5. They comprise a set of four vertical springs coiled around spindles. The set is attached to the shackle bolts in case of full or three-quarter elliptic springs, or in case of a semi-elliptic spring to the shackle bolt and the point of the chassis to which the same is held. The four coil spring spindles are fastened to a base-plate and also to a top plate having four openings through which the spring spindles slide. One spring shackle bolt is attached to the slidable plate, while the second shackle bolt, or the end of the frame, is rigidly held to the connection piece holding the four spindle tops in rigid relation. On striking a bump the coil springs are compressed, while if the wheels descend into a hole in the road they are put under tension. These auxiliary springs are also made especially for truck service, in which case double coil springs made of stronger steel are used in place of single coils.

The Mayer Manufacturing Company, of Chicago, Ill., now makes the Skinner recoil checks, Fig. 12. Each of these comprises a spiral spring, the circumferential end of which is fixed to the spring frame, while the central portion of the spiral spring is connected to a lever carrying a metal loop at its end. Through this loop a heavy leather strap is laid, which is drawn under the axle, providing for a flexible connection between chassis and axle. If the axle is thrown upward or downward the spiral spring, which is under tension in its normal state on the car, tends to take up the shock, distributing it through its windings and transmitting but a minimum of impact to the frame and body of the car. The simplicity and efficacy of this construction are obvious.

The Gabriel Horn Manufacturing Company, of Cleveland, Ohio, has constructed a Rebound Snubber, the principal object of which is to check the sudden recoil of the car springs. As Fig. 11 shows, it consists of two semicircular castings, one of which is held stationary by means of a set-screw fastening it to the chassis frame. The other casting is attached to a sleeve slidable on a stud extending from the central portion of the stationary part. The two castings are held apart by a coiled spring which is normally under compression. Around the two semicircular castings a piece of metal-faced belting is wound five times, one end being atached to the stationary casting by the end of the facing, while the other end of the belting is fixed to the axle of the car by means of a steel clamp. The device affords protection to the springs, especially if the axle is thrown up when striking a bump. Then the belting slacks and permits the coiled spring to expand between the two castings. The gradual compression of the spring on the return of the axle to its normal position checks the rebound of the car springs, thereby increasing the easy-riding qualities of the car.

Reference to Fig. 15, of the product of the J. M. Shock Absorber Company, of Philadelphia, Pa., shows that it consists of one or two tubes or casings closed at top and bottom and each containing a coiled spring. The top of the casing is a unit with the cylinder and is connected to one shackle bolt, while the bottom plate of the casing is connected to the other shackle by a

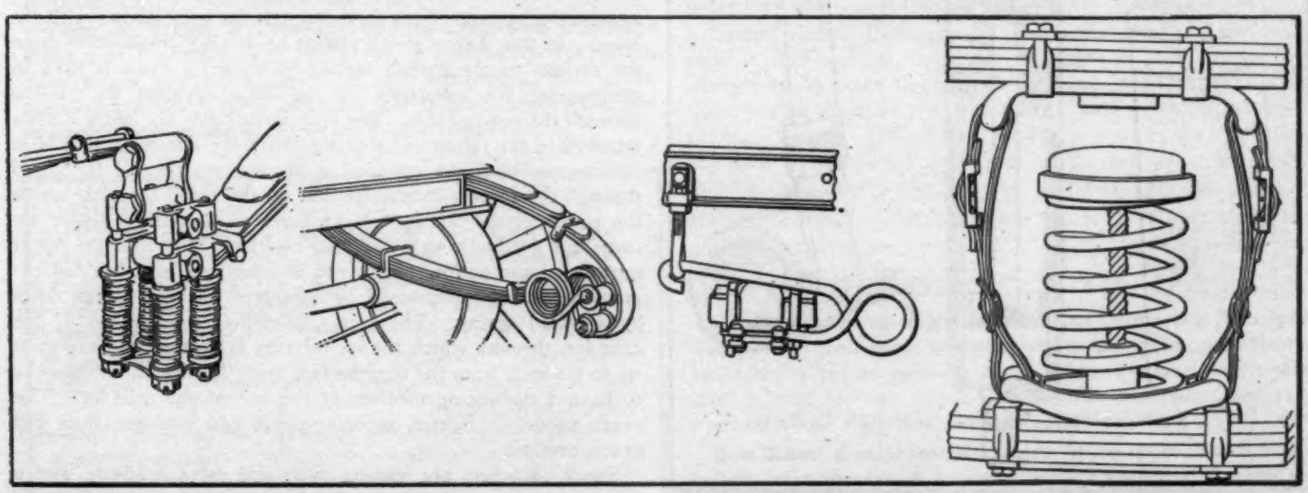


Fig. 5—Velvet auxiliary spring. Fig. 6—Acme torsion spring. Fig. 7—Ideal shock absorber. Fig. 8—Detroit equalizer spring

U-shaped steel rods. The spring is a strong one, fixed to the top cover so that it resists the compression caused by an upward movement of the bottom plate or a downward movement of the top plate.

Spring-Friction Type

Springs are the shock-absorbing members in the Peerless device of the J. H. Sager Company, of Rochester, N. Y. This shock absorber is of conventional exterior, it being of the scissors type. One arm is integral with the casing and preferably attached to the chassis frame, as in Fig. 3, while the second arm enters the casing and has linked to its end a two-throw cam. This cam works between two hardened levers which are fulcrumed at one end, its normal position being such that the eccentrics lie between the two levers. The two arms are connected to the members which are attached to frame and spring by hardened steel joints turning in bronze bushings. If the position of the arms is changed from normal the two-throw cam presses apart the two levers in the casing, but this tendency is resisted by the coiled springs which thus take up the shock. Nuts serve to regulate the tension of the springs and thereby the resistance they offer to a given shock. The more the position of the arms differs from normal the greater is the resistance offered to the cams by the springs. The company also manufactures the Rochester & Simplex bumper, which is securely attached in 10 minutes by set screws and without drilling holes.

The Connecticut Shock Absorber Company, of Meriden, Conn., makes a shock absorber which is very like in appearance to the type just described. The manner of attaching is very similar, and Fig. 4 shows the internal construction consisting of a three-throw cam attached to the movable arm and bearing against three sets of flat springs faced with bone fiber which are held under normal compression by the casing, adjustable by a nut. A deflection of the cam from its normal position meets a resistance on part of the flat springs. To obviate all friction, the casing is filled with non-fluid oil and made grease tight to avoid leakage of the lubricant or entrance of foreign matter. The cam is so designed as to be able to meet the increasing resistance of the springs in just the measure necessitated by the requirements of the situation. The principal change in this device as compared with last year's type is in the introduction of a nut on the periphery of the casing for adjusting purposes. Last year this work was done by turning a serrated washer, and in order to get at it the casing and a packing had to be removed. In this way the improvement is quite a step toward greater accessibility.

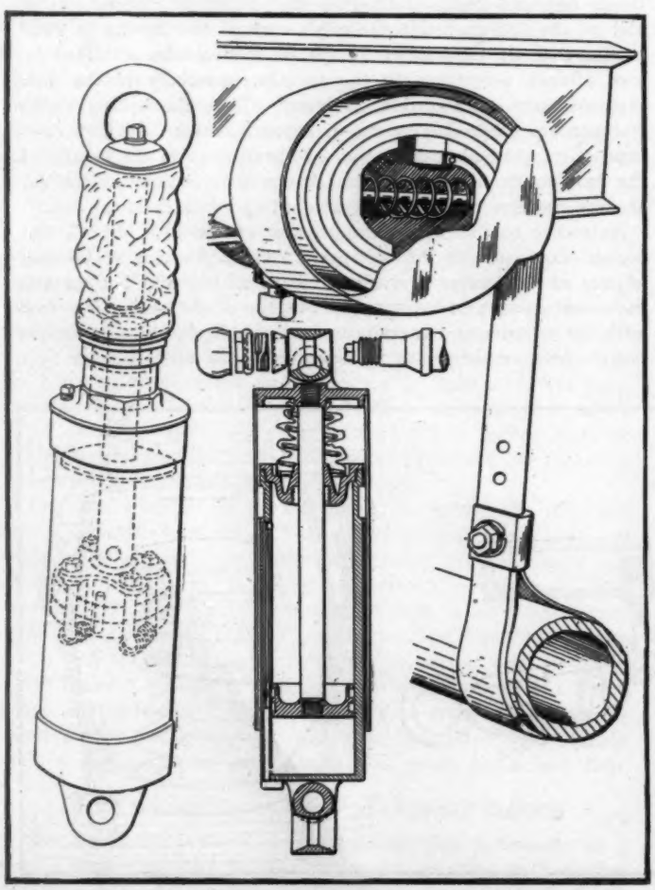


Fig. 9—Flentje hydraulic type Fig. 10—Kilgore shock absorber. Fig. 11—Gabriel rebound snubber

Air and Fluid Shock Absorbers

The Kilgore shock absorber, made by the Kilgore Manufacturing Company, of Boston, Mass., comprises a cylinder and piston, the former filled with air. The cylinder is connected to the spring and the piston rod to the chassis. If they are moved relatively to each other the air is forced through two ports and a narrow outside passage from the lower cylinder space to the upper or *vice versa*. Fig. 10 shows this construction, the cylinder and piston, as well as two ports to the passages connecting upper and lower cylinder section. The piston rod is attached to the body of the automobile by a universal joint, it being a unit with the outer absorber casing, and the piston is normally held in middle position by a spring attached to the cylinder top and the upper end of the piston rod. A second universal joint secures the absorber cylinder to the axle. If a bump is encountered the cylinder is pushed up, or, one may say, the piston pushed down into the cylinder. This action forces air through the lower port into the air passage along the cylinder wall, and into the upper cylinder compartment. The resistance thereby created dampens the shock; it is proportional to the relative speed of the piston against the cylinder, and the air ports and passage are small enough to permit only of gradual adjustment of relations. If the piston has travel far enough either way to cover the port it was traveling toward the air in the end of the cylinder end is compressed and takes the shock which otherwise would go to the springs. The passageway being the same for both upward and downward travel of the piston, the long and short spring leaves are afforded equal protection.

The Flentje shock absorber, of Ernst Flentje, Cambridge, Mass., consists of a cylinder containing a reciprocating piston and filled with an oil mixture to within 1-2 inch of the upper cylinder end. The piston rod is fixed to the chassis and the cylinder to the spring. The piston has three small and four large holes bored in it, through which the oil mixture may pass if the piston is moved up or down in the cylinder. If the piston rises or descends slowly the oil passes easily through the holes in it, while if a shock is imparted to the piston the resistance against the passage of the fluid through the holes grows with the speed. In this way, a shock cannot be directly transmitted from the springs to the chassis and body, since its force is used in overcoming the resistance of the liquid against its passing through the piston holes. The four large holes are below a plate attached to the piston rod directly above the piston, so that if in striking a bump the cylinder is thrown up the oil is forced through the seven piston holes, but on the recoil the plate above the piston closes the four large holes so that the cylinder returns but gradually to its normal position. For 1912 the upper portion of the hollow piston rod is contained in a braided expansion packing compressed by a tapered bushing forced down by a coiled spring. There is a filler-hole on the top of the cylinder, through which the oil mixture is poured into the same up to 1-2 inch from the top, the rest being filled with air in order to have a cushioning medium at the end of the cylinder. This year's model is lighter, more compact and stronger than last year's product.

Shock absorbers are making more and more headway, and it may safely be predicted that in the near future motorists will come to generally recognize that the installation of these de-

vices on a car is a matter of economy and necessity, not one of waste and pure luxury. They will understand that a good suspension is as important as good carburetion; that a decrease of wear and tear is as valuable as a reduced fuel consumption for a given amount of power delivered at the wheels, and that comfort is not bought at the expense of economy, or *vice versa*, at least so far as riding in a motor car is concerned.

What Gear Makers Show

Brown & Lipe Gear Company—Brown & Lipe steering gears are of the worm-and-gear type this year, while previously the worm-and-sector design was employed. Both on worm and gear 1-500-inch play is allowed for taking up wear; the lower bevel runs in oil. The parts turn on Timken roller bearings throughout, and they are of 3.5 nickel steel, hardened and heat-treated.

Gemmer Mfg. Company—Gemmer steering gears are continued without material changes in their existing designs, and progress is chiefly along the line of refinement of details, as well as of the selection and treatment of the steel used in their manufacture. Means for better lubrication have been provided at more points than before. For instance, there is a new grease cup attached to the end of the shaft carrying the gear meshing with the worm. (Fig. 16.) This shaft is drilled to provide an oil passage, and in addition to this feature the old grease cup above the center of the shaft is continued. Greater accessibility has been provided where the designer has found a chance of doing so. A worm-and-gear type of steering gear for commercials from 1,000 to 5,000 pounds is shown, while for trucks above 2 1-2 tons the interior and exterior nut type of design is used, which is similar to the Gemmer C pleasure car gear, but of heavier construction.

Warner Manufacturing Company—This concern continues its product without material changes in design or material, but a number of minor refinements have been added which make the care and operation of the steering gear easier for the driver or mechanic. Besides, this company has added the manufacture of motors to its line for 1912.

Warner Gear Company—This company's product contains no radical alterations either in design or material and treatment of the latter.

The Spring Exhibits

American Vanadium Company—A full line of this concern's product is on display, among which are springs similar in every way to those shown last year.

Peter A. Frasse & Company—Silico-manganese steel, the product of the Austrian Poldi works, is emphasized for spring construction in this exhibit. The main difference between the merchandise shown this year and last is that the present line is slightly lighter and said to be stronger than before.

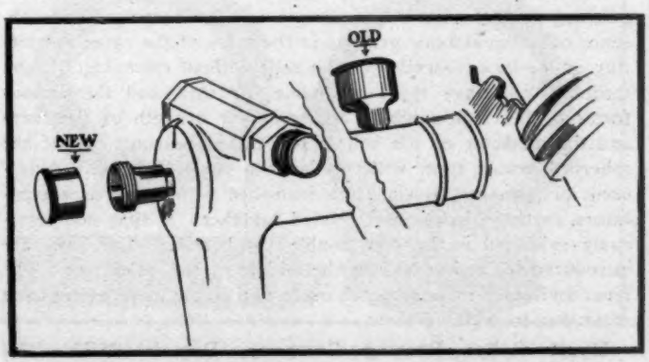


Fig. 16—Gemmer steering gear oiling cups

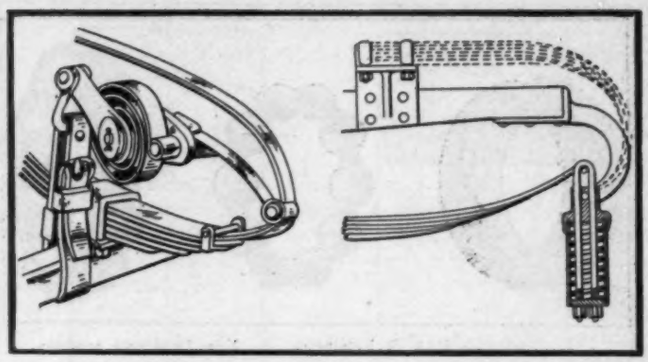


Fig. 12—Skinner recoil check. Fig. 13—Section of J-M shock absorber

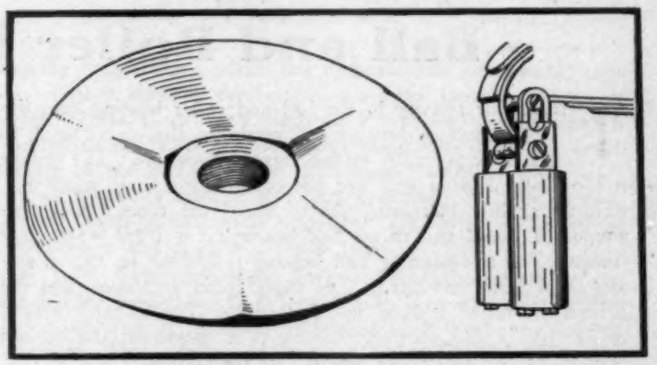


Fig. 14—Wedging disk of the Mondex shock absorber. Fig. 15—J.-M. shock absorber

Marburg Bros.—Carbon steel springs, guaranteed by the company to have an elastic limit of from 190,000 to 195,000 pounds to the square inch, are featured in this display. The chief claims made for this variety of springs are uniformity and comfort as well as great strength.

Perfection Spring Company—While the exhibit of this concern was not installed on opening night, it is understood that it will contain all the important features of last year's display with numerous minor refinements, particularly in the matter of reduced weight of the alloy-steel springs.

Sheldon Axle Company—A line of alloy steel springs is shown by this company. The line is practically the same as last year.

Smalley Daniels—This company shows four automobile springs of light, strong construction. The only special claim made for them is that they mark a new era in the matter of price.

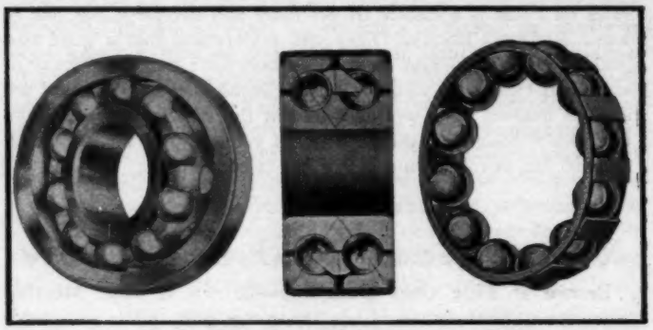
United Steel Company—Chrome-vanadium is the alloy used in the springs shown by this concern. There are few changes to be noted this year in size and shape of springs and these are all directed toward cutting down weight without sacrificing strength. One thing that this company has done is to shrink a collar around the leaves of the springs in the middle to take the place of the bolt that formerly held the leaves together.

Brake Bands and Drums

Calmon Asbestos & Rubber Works of America, New York City.—This company exhibits asbestos packings, asbestos brake lining for automobiles and hoisting engines, asbestos-covered belting for use where contact with heated substances is necessary, and American asbestos metallic gaskets.

The Royal Equipment Company, Bridgeport, Conn.—Raybestos, a friction facing for automobile brakes and clutches, and the Duplex internal brake, a recent addition to the Duplex brake group, are the salient features of this exhibit.

Two F. & S. Retainers. New Departure retainer



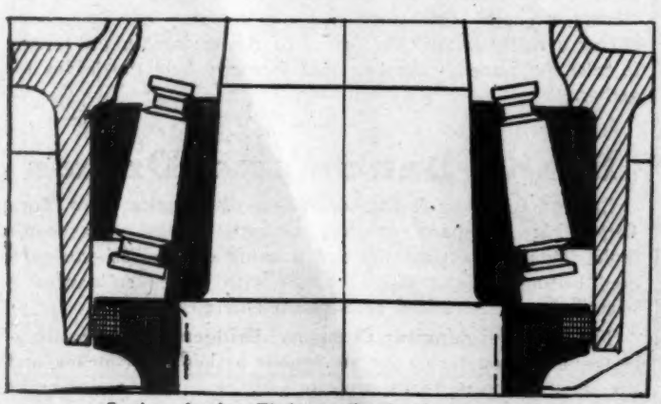
S. K. F. radial, section of New Departure double-row, and Imperial retainer

Ball and Roller Bearings on Show

THE major activity in the ball and roller bearing field lies in the improvement of ball retainers, the object being to get as many balls in the races as possible. The double row of balls is gaining in use, the construction being made possible by slightly increasing the width of the races. Some examples of radial and thrust ball bearings for front wheels are shown. The self-aligning ball bearing is coming in, two examples of it being exhibited. The taper roller continues, and the cylindrical roller retains its following. The spirally wound roller type is also seen. Following is a résumé of the various exhibits of ball and roller bearings at the Garden.

Bantam Anti-Friction Company, Bantam, Conn.—A full line of ball and roller bearings is being shown, among which the groove thrust bearing is of note. The ball retainer is made of bronze, and converted groove collars are used. The bearing is made either with one beveled collar or with both straight. The collar is beveled on one side so that it can be used in connection with a soft leveling or aligning collar. The rollers of the roller-bearings are hardened and ground, are made short and have staggered ends when assembled. The cage ends are steel, while the posts or roll separators are constructed of drawn brass. Each roll retainer is made in halves, these being hinged at one end and anchored by cotter pins at the other, so that the bearing can be fitted over the shaft, instead of endwise.

Barthel, Daly & Miller, New York.—The importers of Schafer ball bearings are exhibiting a combination radial and thrust bearing as well as radial and roller bearings. The separator pieces of radial bearings are the same as used for the past few years. There is a change in the rings which hold the separator pieces together. In place of the ordinary flat rings, a wavy retainer is now used. This merely alters the appearance of the bearing. The combination radial and thrust bearing is of one-piece construction, designed to take a radial and end thrust load. It is suitable for front wheels, steering gears and where a radial bearing is required to take any amount of end thrust. The balls are held in a retainer. A roller bearing has also been added to the company's product.



Section showing Timken roller bearing construction

Bower Roller Bearing Company, Detroit, Mich.—This company exhibits a sample line of roller bearings, together with two or three specimen installations. While the Bower roller bearing is of the parallel roller type, provision is also made for the carrying of end thrust load, this being carried on entirely different surfaces from that which carries the radial load. There is no wedging action to the bearing and it is made non-adjustable as to radial alignment. The bearing is made from electric furnace nickel steel, heat-treated. The end play of the bearing can be adjusted without affecting the centering of the shaft.

J. S. Bretz Company, New York—For automobile construction, the Bretz Company, which is the importer of the F. & S. ball bearings, has both single and double row annular bearings. There are three types of these for light, medium and heavy loads. The double-row bearing is able to withstand a certain amount of thrust, and wheels so fitted do not require separate thrust washers. Two types of ball retainers are used, the light pressed steel type and the heavier solid type. Both are made in two sections. The lighter type has compartments shaped out to accommodate half of each ball. The rivets which hold the two parts together are placed between the balls. The heavier type of retainer has semicircular slots cut in one side of each half to hold the balls. The two parts are held together by pieces of brass placed in slots which register at intervals around the periphery of both of the halves. This special form of retainer allows the balls to utilize 95 per cent. of the annular space. In the double bearings the retainer is so formed as to hold the balls opposite to one another, semicircular slots being provided for them. In addition to the annular types a full line of thrust bearings and special small-size bearings are carried by the company.

Hess-Bright Mfg. Company, Philadelphia—The distinguishing feature of the Hess-Bright annular bearings is the absence of filling slots or grooves in the sides of the races, permitting of the loose assembly of the balls without cramping. Light, medium and heavy types are made for 1912, and the various forms of bearings exhibited differ in the strength of the races and the diameter of the balls. The thrust bearings are of the spherical seated type, with washers to permit of shaft deflections. High-speed bearings are furnished with cast-bronze separators, made in halves and riveted together. A type not previously exhibited is the new double-row bearing. The balls are introduced through a hole in the middle of the inner race. The inner and outer races are each made in a single piece, eliminating error due to dividing them.

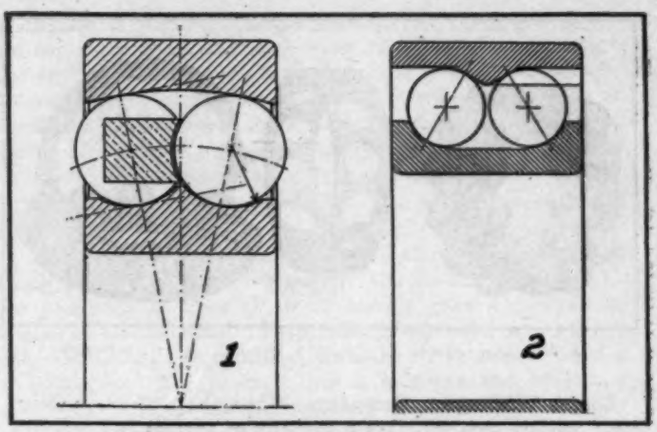
Hyatt Roller Bearing Company, Detroit, Mich.—The Hyatt company is continuing its standard type of bearings for

1912 automobiles. A full and complete line of high-duty bearings is being exhibited, and, whereas they are not a new line, it is the first time they have been shown. The spiral-wound rollers are heat-treated and ground and are constructed of nickel steel instead of carbon steel, which was formerly used. In addition to this a hardened and ground inner sleeve and outer lining are being used. The inner sleeve is between the rollers and the shaft and the outer sleeve between the rollers and the hub. This bearing runs directly on the shaft, and in the outer race there is a button which serves to hold the race in position in the housing. Bearings of all sizes are furnished to the automobile trade.

Imperial Bearing Company, Detroit, Mich.—Bearings of three types—light, medium and heavy—are made by this company. The balls are of English make, while German steel is used for the rings, raceways and retainers. The retainer is light and flexible, being designed to operate with the least possible amount of friction. It consists of a circular plate and a closing ring. When the two are pressed together it is claimed that there is no possibility of their coming apart.

New Departure Mfg. Company, Bristol, Conn.—The New Departure line of ball bearings is very complete and consists of three types. The double-row or combined radial and thrust bearing has two rows of balls and sustains load from any angle. The ball-track has a two-point angular contact, and the design is such that each row of balls carries its part of the load. The cone is solid and there are separate cups which are snugly fitted in the shell. The special manganese bronze separator is in two solid halves, and there are deep ball sockets. The single-row annular bearings consist of inner and outer rings, each with integral curved raceways, separator and balls. The inner side of the outer ring presents the usual curved raceway form, and the inner ring, which is of the same special steel as the outer ring, has a curved groove in its outer side. The retainer is a two-piece bronze type, the two parts being riveted together after the balls are in place. The combination radial and thrust bearing is very similar to one-half of the double-row bearing. A new form of steel retainer is used on this type. It is made in two pieces, the rivet which holds them together being integral with one of the parts. The parts of this retainer are steel stampings, slightly cupped to accommodate the balls. One-half has integral tongues which are bent perpendicular to the part proper and which pass between the balls to the other half where they are riveted. This does away with separate rivets. This retainer has recently been developed by the concern.

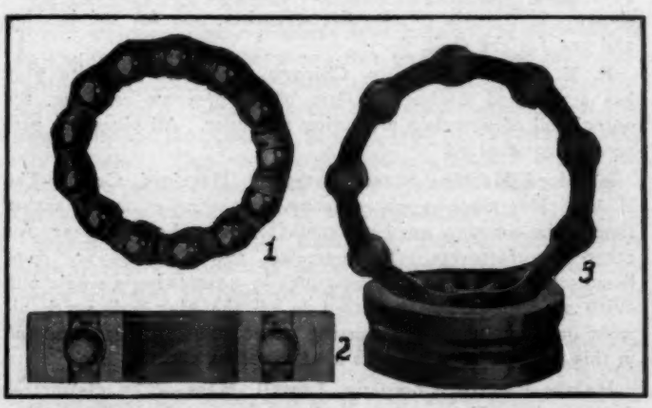
The Rhineland Machine Works Company, New York—Ball bearings with self-aligning rings, double-acting thrust bearings and radial bearings are being shown. These bearings are made in all sizes to meet all requirements. All radial bearings have a special form of separator for holding the balls. This separator is metal ring, with a cavity for each ball and having crescent-shaped tongue pieces which are bent over the balls when in position and hold them in place. A new feature is the self-aligning ring bearing, which has been recently put on the market. This is made in three types, the light, medium and heavy series. There is an outer ring, the inner side of which has a concave shape. Fitting inside this ring is the cage, the outer surface of which is convexed to fit inside the outer ring. Correct alignment is assured since the two rings must be in contact at points diametrically opposite. The balls of all thrust bearings are held in place by brass cages.



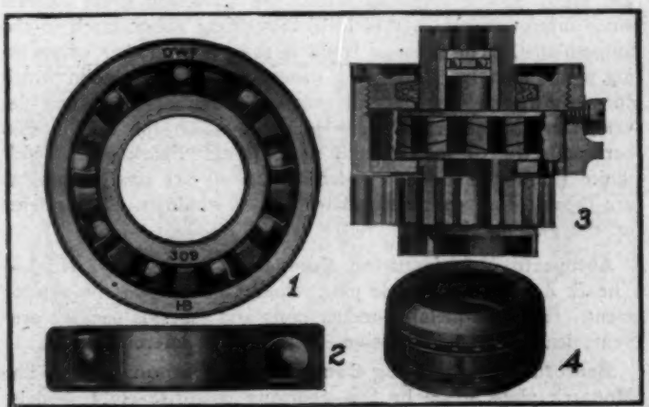
Two double-row sections. 1, S. K. F.; 2, Hess-Bright

R. I. V. Company, New York—The retainer used in the annular bearings of the R. I. V. Company is of such construction that assembling of the balls without forcing them into place is permitted. The retainer is made in halves so that when the halves are put together they form a separate cage for each ball. This admits of the use of a very hard race to prolong the life of the bearing. These retainers are machine cut, giving uniform spacing. The company also shows its side-entrance full-race bearing. Radial and thrust bearings of all sizes are manufactured, and a representative number of each are to be seen. Three types of the former are made, the light, medium and heavy forms.

S. K. F. Ball Bearing Company, New York—This concern makes a specialty of radial self-aligning ball bearings. Four types of these are made, the light, medium, heavy and extra heavy. The bearings are made of Swedish crucible alloy steel which is free from sulphur and phosphorus. They are hardened and tempered. The balls are accurately ground, and the inner and outer races are annular. The balls are arranged in two circles, being carried in staggered pockets in the opposite sides of the one-piece retainer, and they are so seated that the line connecting the inner and outer points of contact of each ball passes through the center of the bearing. The inner race is provided with two grooves, each having a radius slightly larger than that of the balls.



1. Rhineland retainer; 2, Section of Rhineland radial; 3, Standard bearing parts



1. Hess-Bright radial; 2, section of same; 3, Hyatt roller bearing; 4, Hess-Bright double row

F. & S. double retainer The R. I. V. retainer parts

Sparks-Withington Company—While the Sparks-Withington Company does not make a specialty of annular ball bearings, it has included some of these which it makes on order. No changes have been made in this special line, and the bearings are of all sizes. The raceways are of pressel steel, and the cups are specially heat-treated and hardened steel.

Standard Roller Bearing Company, Philadelphia.—Roller bearings of all sizes and types are shown. For automobile purposes the company features its taper roller bearings, grooved ball thrust bearings and annular ball bearings. The first of these is a new bearing and has solid tapered rollers with races and cones of special steel, the temper being drawn, making them tough and preventing them from chipping or breaking under severe service. The stamped retainer is of the same general type as that used for several years. The annular bearing consists of inner and outer raceways in the form of two rings of special alloy tool steel, the balls running in grooves. Each ball is carried in a separate pocket, the retainer being formed in halves riveted together.

Timken Roller Bearing Company, Detroit, Mich.—No changes have been made in the Timken line for this year. The usual forms of taper roller bearings of all sizes and for a variety of uses are exhibited by the company. New processes of manufacture of the rollers of these bearings have been devised to insure each roller being the exact counterpart of any other roller. The rollers are tapered and the holders or cages are of the same form as used for a number of years. All rolls, cups and cones are made of 3 1-2 per cent. nickel steel, heat-treated and case-hardened. These bearings are made in two lengths, the short-series made interchangeable with annular ball bearings, and the long-series type.

Spark Plugs Prominent

SPARK PLUGS of all descriptions are much in evidence as usual at the Garden this year as is usually the case. There are many new innovations which are attracting great interest since improvements in this little instrument mean much to the automobilist. The greatest trend is toward a number of sparking points included in the plug instead of the single point which formerly marked the general practice. Another interesting development is the transformer plug, in which the low tension current is transformed directly at the plug. Spark plugs which ignite through a stream of lubricating oil are also shown, as are those which are arranged with glass windows. The stories of the exhibits follow.

Autoparts Manufacturing Company, Jersey City, N. J.—The E. Z. quick detachable plug requires no wrench for adjustment. It has no metal-to-metal joints and asbestos packing prevents leakage of compression. The core is interchangeable.

Benford Manufacturing Company, Mt. Vernon, N. Y.—The Monarch plugs made by this company comprise eight models, two porcelain and six mica types. The leader of the line is the Monarch magneto plug which has a very heavy core to insure perfect insulation. The firing-points are constructed in the shape of a star to secure constant firing under all conditions. This plug works with either magneto or batteries.

Best Ignition Company, New York City.—The Best spark-plug shown by this company has a button head which acts as a condenser, producing an intense spark, the heat retained in the button being sufficient to evaporate any oil thrown upon it as well. The porcelain is heavily insulated and protected and provision is made for the contraction and expansion of the electrode without causing pressure upon the inclosing porcelain. No adjustment is necessary.

C. G. Blickensderfer Company, Stamford, Conn.—The feature of the Bull's Eye spark-plug is that glass bull's eyes in the body of the plug permit the efficiency of the plug's operation to be seen without removing the plug from the cylinder head. The state of the mixture may also be ascertained in the same way.

Bosch Magneto Company, New York City.—There are no radical changes in the general construction of the Bosch high-tension plugs this year. The steatite insulator is of great strength and the plugs are made gas-tight by assembling the parts under heavy pressure. The ends of the three sparking-points has been changed to a crescent shape producing the spark in sheet form. The new shape gives the points a lower electrical resistance.

Champion Ignition Company, Flint, Mich.—In this exhibit is shown the AC Star plug which has a very short, heavy porcelain and a metallic gasket with a knife edge. The heavy porcelain makes the plug very strong and durable and the gasket prevents leaking. The company also shows the AC Standard plug and the AC Waterproof in which a porcelain, secured by a clamp, protects the connection. The main feature of the exhibit, however, is a new plug of special design which may be used with acetylene gas engine starters. As shown in the illustration, this plug has a passage to lead the gas direct to the sparking point of the plug.

Frontier Specialty Company, Buffalo, N. Y.—The All-In-One spark-plugs differ from the usual design in that a pet-cock is attached to the plug for priming purposes making starting the engine on a cold day much easier than with the ordinary pet-cock which does not direct the gasoline straight to the sparking points.

Emil Grossman Company, New York City.—The constructional features of the Red Head spark-plug are the metal disks and the packing, allowing contraction and expansion of the electrode, sealed in a brass cap, under the shoulder at the top of the porcelain, that eliminates loss of compression. The porcelain itself is guaranteed not to crack from heat. The flexible cone under the bushing distributes the pressure evenly through the porcelain and prevents cracking. The shell is cut from one-piece steel and has a blued-oil finish. The center electrode and firing point is of meteor wire. The Red Head plug wrench set is also shown. It consists of two flat wrenches, one for the bushing and one for the shell.

R. E. Hardy Company, Chicago, Ill.—The Sta-Rite plug has a patented double porcelain which prevents cracking, the outer shell of porcelain protecting the inner. All plugs are perpetually guaranteed.

Hartford Machine Screw Company, Hartford, Conn.—The H. M. S. plug made by this company is a newcomer on the market though the company has been manufacturing plugs for years for other manufacturers. The porcelain and electrode are combined and may be removed as a unit by unscrewing a single nut. With sparking-points immersed in oil the plug will spark almost indefinitely without missing. The company has embodied in this plug the results of its long experience in this line.

Heinze Electric Company, Lowell, Mass.—The distinctive feature of the Heinze plugs is that there is a fixed distance between the sparking points and the spark gap cannot be changed.

Mica free from metallic oxides is used in the mica types and the porcelain cores used in the porcelain types are made by hand.

Herz & Company, New York City.—The characteristics of the Herz plug, called the bougie Mercedes, are that double, unbreakable stone is used instead of porcelain, and that four platinum-alloy sparking-points are provided which, being self-cleaning, do not carbonize. The plug is guaranteed for a year.

Jeffery-Dewitt Company, Detroit, Mich.—This company makes and sells two types of plugs—petticoat and closed end. Both are guaranteed soot-proof and require no cleaning. Bushings are case-hardened and, with the shell, accommodate the different shape porcelains. All porcelains are of a new heat-proof composition and are made in the company's own pottery. The Standard conical type plug also shown by this exhibit has a visible spark.

M. M. M. M. Company, Inc., Marshalltown, Ia.—The V-Ray plug may be readily separated into two parts for cleaning purposes. The main feature is that four V-pointed sparking-points surround the electrode, thus insuring both a sure spark and durability for the points. A knurled end is provided on the binding-post screw which is adapted to fit the four V-points at once so that by applying this rough end all carbon is removed from the points. All plugs are guaranteed for life.

A. R. Mosler & Company, New York City.—The Mosler Spit-Fire plugs are made in all sizes in battery, magneto with nickel wire, magneto with iridium-platinum point, racing with platinum point and breech-block types. The base protects the porcelain and sparking-point and acts as a condenser for the electricity and as a compression chamber for the gas. A bracket for the breech-block type is also shown, which forms an adjustable spark-gap for testing purposes. The breech-block type is the plug with a handle which requires no wrench to remove it from the cylinder head.

Oakes & Dow Company, Boston, Mass.—The Sootless plug is so constructed that carbon does not accumulate on the sparking points. The plugs does not short-circuit.

Progressive Manufacturing Company.—The distinguishing features of the Black Eagle plug made by this company are the spring clip connections which facilitate removal and insure a good contact at all times.

Start-O Company, Cleveland, O.—The Victor plug is designed for use with any gas engine starter. It leads the charge directly to the sparking-point, obviating the necessity of tapping through the waterjacket or of removing petcocks. It is readily detachable.

G. A. Walker Machine Company, Boston, Mass.—The Ballite plugs are practically indestructible, will not leak nor soot. The construction is very simple in both the battery and magneto type of plug.

Radiators Unchanged

THE various radiator concerns who have placed their wares on exhibition at the shows this year have not made any startling innovations. One point of interest, however, is the fact that a large number of concerns are now making it optional with the purchaser as to what type of radiator he may wish to select. One concern will make a tubular, cellular or honeycomb radiator, according to the desires of the purchaser. The following exhibitors were prominent:

Briscoe Manufacturing Company, Detroit, Mich.—This company makes a specialty of its Mercedes type of radiator, though it makes all types of radiators, fenders, hoods, etc., to order.

El Arco Radiator Company, New York—A straight-tube type of radiator is made by this company. Sheet bronze is used and the tubes are corrugated to provide ample cooling surface and at the same time to keep the water from passing through the radiator too rapidly.

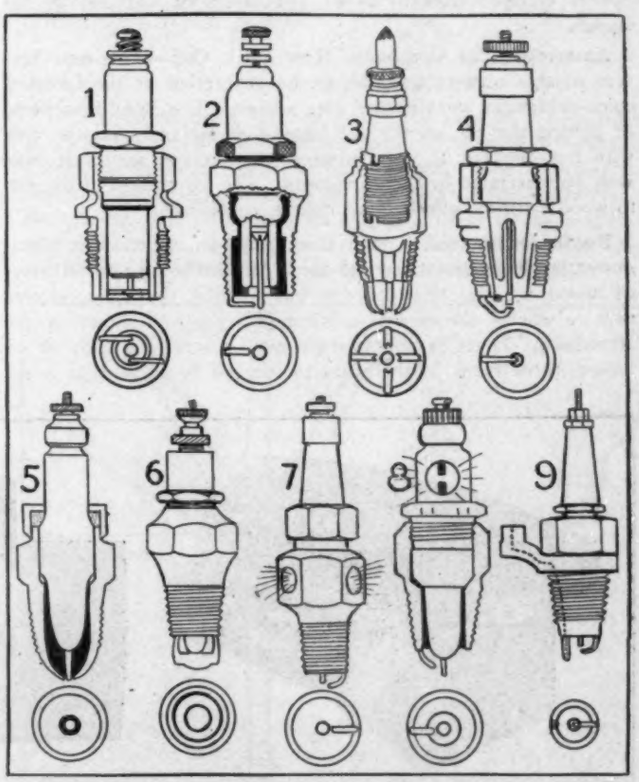
English & Mersick Company—This company makes two regular stock types of straight-tube radiators. One is a wireless type, in which the water flows straight through the radiator. The other is a wired style in which the water is given an irregular course to the bottom of the radiator. The company makes all kinds of automobile hardware, such as door-latches, locks, etc., and radiators in any type or size desired.

Fedders Manufacturing Works—The main feature of the Fedders line is the square tube radiator. This is made up of square copper tubes so arranged that all sides of each tube come into contact with the water. The square tubes preclude the possibility of clogging or of trouble from contraction or expansion of the metal. Each tube is removable and replaceable. Radiators are furnished with the tubes staggered or in straight lines. The company makes radiators and fenders in any type or style of construction to order.

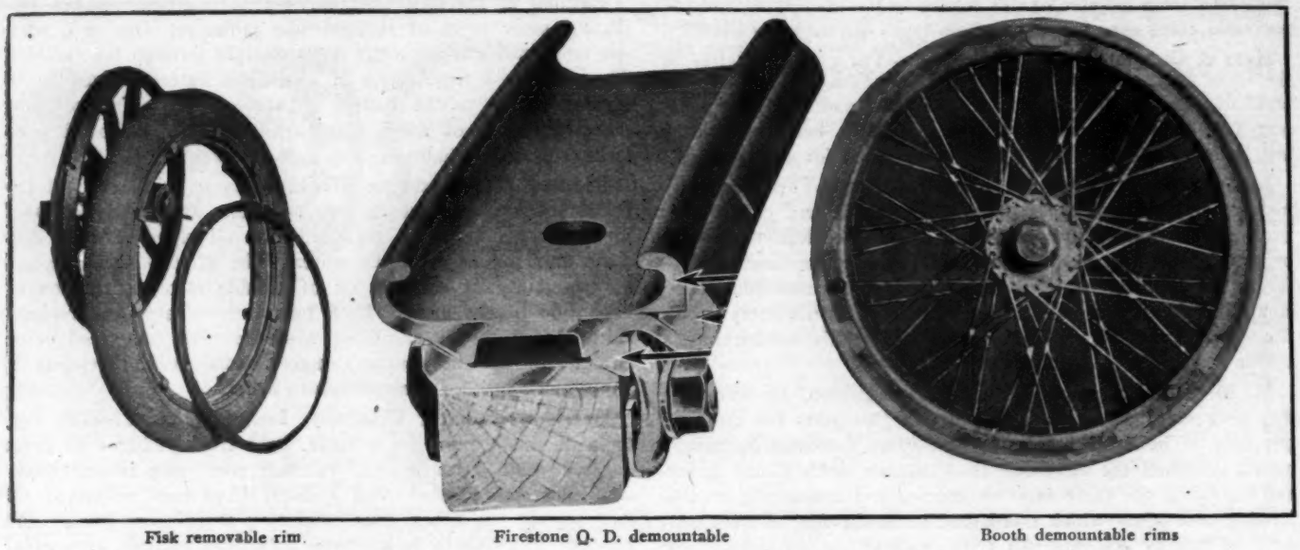
Harrison Radiator Company, Lockport, N. Y.—The features of this exhibit are a large, light truck radiator of great durability and a touring car radiator possessing similar qualities. The fins of the truck radiator have been projected 1-2 inch beyond the tubes, thus protecting them from bumps and knocks. The light weight of the radiator eliminates, to a great extent, the probability of leaks from jars or shocks.

Philadelphia Show Ready

PHILADELPHIA, Jan. 8—Everything is in readiness for Philadelphia to make her swing into the show circuit next Saturday night. Unlike last year, when no formalities were observed on opening night, the show committee of the Philadelphia Automobile Trade Association, consisting of Messrs. Hipple, Chairman Wister, Eveland and J. H. Beck, the latter as manager of the show, has concluded arrangements with Mayor Blankenburg whereby the latter will officially start off the two weeks exhibition. During the first week a total of 53 gasoline pleasure cars will be shown in the two armories. During the second week there will be 37, with perhaps 40 commercial vehicles.



1, Black Eagle; 2, Mezger; 3, V-Ray; 4, Red-Head; 5, Monarch; 6, Best; 7, Bulls-Eye visible; 8, Standard visible; 9, Champion special starter plug



Fisk removable rim. Firestone Q. D. demountable Booth demountable rims

Demountable Rims Excite Interest

MANY cars are this year including demountable rims in their equipment. This feature has excited the interest of the observers at the show to a notable degree so that it is the case that the exhibits of demountable rims are drawing their supply of the attention of the crowd. The trend of the season is towards one-nut controls of the rim so that the speed with which the rims may be removed and reattached has been greatly augmented. One of the most interesting features brought out in connection with demountable rims is that in which the felloe of the wheel is entirely dispensed with and the rim is clamped directly to an attachment at the end of the spokes.

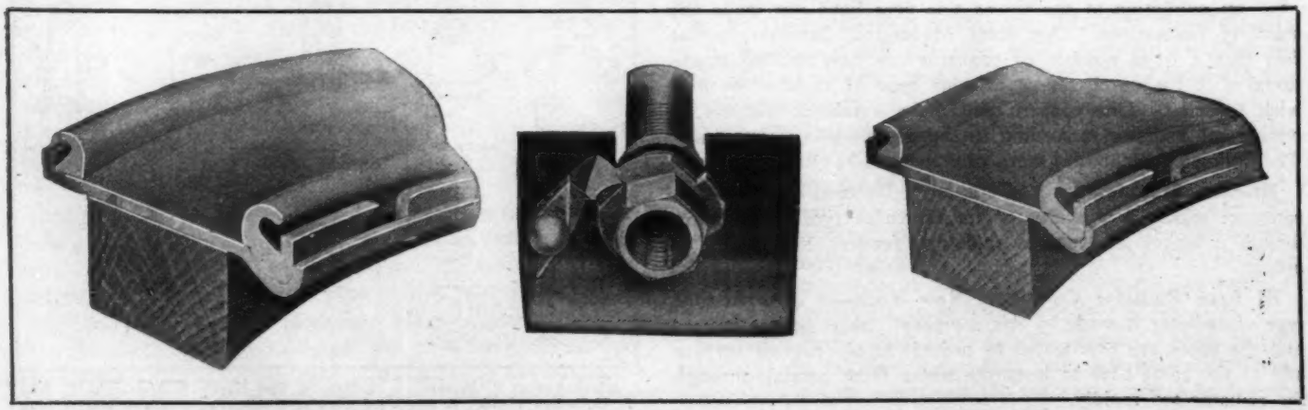
American Rim Company, New York City—The new feature of this concern's exhibit is the adaptation of the Lambert quick-detachable rims to the wire wheels. The familiar scheme of putting the rim on the tire instead of the tire onto the rim, with but one nut to manipulate to loosen and secure it, was well demonstrated by the attendants. The application of the rim to wood artillery wheels is, of course, continued.

Booth Demountable Rim Company—In addition to demonstrating its demountable and quick detachable rims for all sizes of wood wheels, this concern has applied the same system to wire wheels, the ease of application being well shown by the attendants. There is not a single nut or screw to take off or loosen, three turns of the brace to the left being all that is required to remove the tire, and a similar number of right turns securely locking it on.

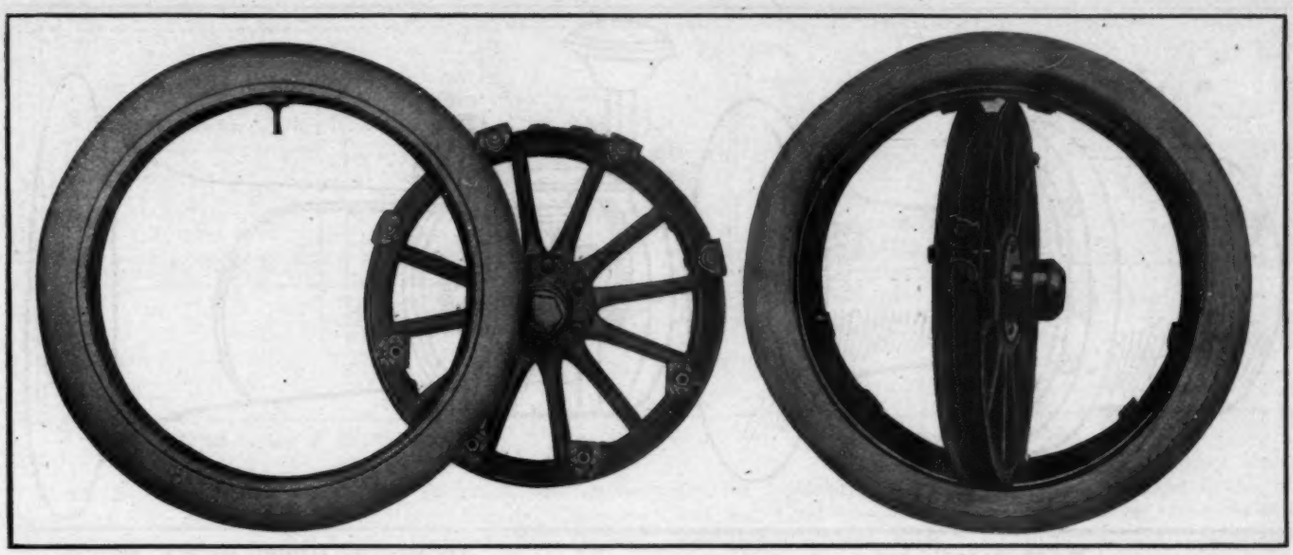
Dorian Remountable Rim Company, New York City—Simplicity is emphasized in the operation of this rim by the attendants in charge of this exhibit. The remarkable success that has attended the use of these rims in last season's big races has been of much benefit in the popularization of this particular type. "Just turn four nuts"—the Dorian slogan—is visually demonstrated by the experts from time to time.

Firestone Tire and Rubber Company—Quick-detachable demountable rims for pleasure and commercial cars using pneumatic tires are being demonstrated at the exhibit of the Firestone company. Among the features of these rims are the means adopted to exclude moisture by means of the no-split base and by a leather washer around the valve-stem hole; the facility with which tires can be detached, whether the rim is on or off the wheel; absence of intricate mechanism to get out of order; simplicity in the matter of necessary tools, lightness, etc. The dual demountable for commercials is operated in the same manner as the single rim and without special tools.

Fisk Rubber Company, Chicopee Falls, Mass.—One of the most convincing demonstrations of ease and facility of tire changing is to be had at the exhibit of this company, where the demonstrators do the quick-change stunt at intervals to the delight and wonderment of the onlookers. The absence of short



Standard Universal Q. D. No. 2 Lambert locking device United Rim Co.'s Q. D. No. 2



Component parts of Dorian Remountable Rim

Construction of the Booth Demountable Rim

stay-bolts on the Fisk rim facilitates the handling of a tire whether on or off the wheel.

Newmastic Tire Company, New York City.—A new device for getting rid of the felloe with its great weight of 40 to 60 pounds per wheel is shown in this exhibit. It consists of a clamp for each spoke, easily applied to the end, which is adjusted by means of a screw-bolt. These clamps may be fastened directly to a Firestone demountable rim and the bolts screwed tight in a very short time. The clamps themselves weigh less than 2 pounds, so nearly the entire weight of the felloe is eliminated.

Standard Welding Company, Cleveland, O.—This pioneer concern in the quick-detachable rim field is showing various types of Standard Universal detachable-demountable rims. A very handsome folder describing in detail the simple operation, and illustrated by blueprints, is being distributed to interested inquirers.

United Rim Company, Akron, Ohio—Quick-demountable and quick-detachable features are prominent in the exhibit of Standard Universal rims of the above-named concern. The claim is made that two turns will unlock and the same number of turns lock the No. 1 and No. 2 demountables, while on the No. 3 it is only necessary to tighten up or unscrew the wedge. By means of the quick detachable feature a tire may be changed or the rim changed with the tire inflated in an equally short space of time.

United States Tire Company, New York City—Proceeding on the theory that the first essential of an efficient delivery system is promptness, the above-named company has met the issue with the United States Standard quick demountable rim, especially designed for trucks with dual tire equipment. The demonstrators show to the satisfaction of onlookers that the change may be made with speed and facility by one man. After jacking up the axle, the nuts and washers are removed, the outside flange wedge ring is slipped off, followed by the outside tire; after removing the center wedge ring the inside tire slips off easily without disturbing the wheel.

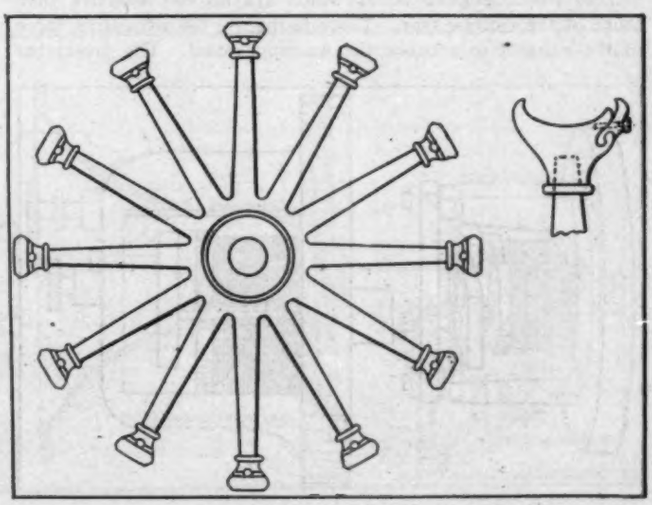
Weston-Mott Company, Flint, Mich.—Besides the front and rear axles and countershafts which form the main feature of the company's exhibit, the virtues of the Baker bolted-on and Universal quick detachable rims are being demonstrated. These are made in the straight-side, built-up clincher and regular clincher types.

Paragon Auto-Parts Manufacturing Company, Inc., New York City—This line includes cellular, tubular, honeycomb and coil radiators, hoods, mud-guards, tanks, combs, fans, mufflers, lamps, tool-boxes, mud-aprons, etc. The feature of the exhibit is the square-tube, honeycomb radiator constructed of 1-4- to 3-8-inch square tubes spaced with wire. The straight water channel prevents stagnation and deposit of sediment. Freezing will not injure the radiator. The company also features a boiler-tube type radiator for trucks. It is especially designed for heavy work, being constructed of 5-16-inch to 3-8-inch round tubes set horizontally between two heavy plates of metal, the tubes expanded on each end. Freezing cannot cause this radiator to leak.

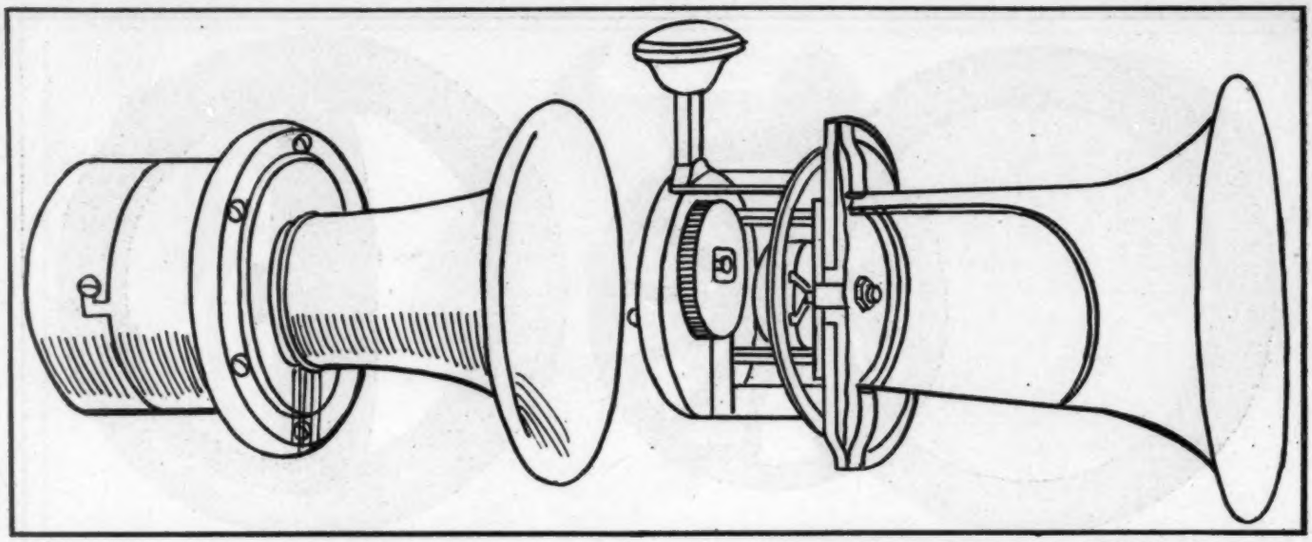
The Coventry Chain Company, Ltd., Coventry, Eng.—All sorts of chains suitable for use in all sorts of automobiles are shown in this exhibit—block, pump, magneto, compound, standard roller and integral chains. The company also shows the Coventry noiseless chain for fast power transmission, especially suited to motor bus and truck use, and the high-speed reversible driving chain for aeroplanes.

No Elba Self-Starters

In THE AUTOMOBILE, issue of January 4, page 36, the statement is made that the Willard Storage Battery Company is marketing a self-starting and electric lighting system. The company announces that it is not putting an apparatus of this character on the market, but is confining its efforts entirely to the manufacture of batteries, specially intended for use with electric lighting outfits, these batteries being known as the Elba type.



No-felloe device exhibited by Newmastic Tire Company



The Monoplex electric horn

Ratchet-and-pawl operated Long horn

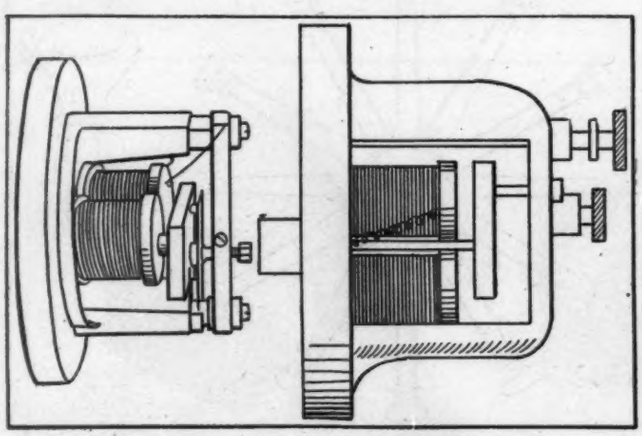
Horns of All Types on Exhibition

VARIETY marks the horn exhibit at the Garden show. Every type imaginable, from electric motor driven to the common or bulb variety, were shown by the various exhibitors. Some of the horns that attracted a great amount of attention were those in which the power was given by a pressure of the foot or hand on a lever which actuated a ratchet device operating on the diaphragm. The motor-driven and vibrator horns continue to be popular as was evidenced by the interest displayed. Various types of projectors are made for various purposes. The torpedo type attracts great attention on account of the peculiarities of its shape.

After the popularity of electric horns had confirmed their positive value to the automobilist, a considerable number of electric sundry makers recognized the opportunity of breaking into this field, and during the short period at their disposal, they have succeeded in what must be called masterpieces of modern engineering. A number of excellent and efficient productions have been brought forth, and aside from developing a strong and impressive signal, they do so at a marvelously low current consumption, as a perusal of the following descriptions shows. Stimulated by the success of electric horn manufacturers, other makers have designed horns which are no less effective than those of the electric type. These horns use the expansive force of the exhaust to produce the warning sound. The prominent types of this class of horns are also described and illustrated herein. But all these instruments are higher priced than the average bulb horn working on the old-fashioned horn principle and thus it is seen that an immense business is still being done in this kind of warning signal.

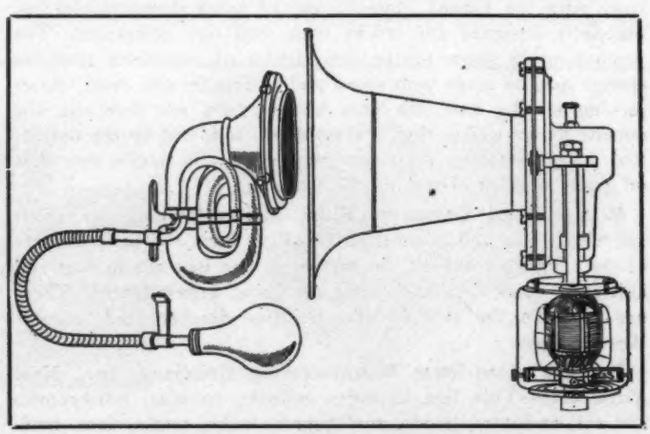
Atwater Kent Mfg. Works, Philadelphia—At this exhibit is shown the Monoplex electric horn in three types—A and M for automobiles and D for marine service. Clamped to a spoke of the steering wheel, the operating push-button is always within instant reach of the driver's thumb or finger tip. The principle upon which the Monoplex operates is exceedingly simple. A steel diaphragm is forcibly struck by an electro-magnetic mechanism, causing a series of rapid vibrations to be set up in the diaphragm, the sound waves thus produced being amplified and directed by the bell of the horn. When the button is pressed the sound is instant and penetrating.

Automobile Supply Mfg. Co., Brooklyn, N. Y.—The Newtone, a motor-driven automobile signal, is shown in three types, the Torpedo, Type M and Type N. It is featured by a rust-proof diaphragm actuated by a miniature electric railway motor, requiring no oiling, the best system of ball bearings being used for the armature shaft, and it is thoroughly moisture proof, the field and armature winding being well insulated and baked.



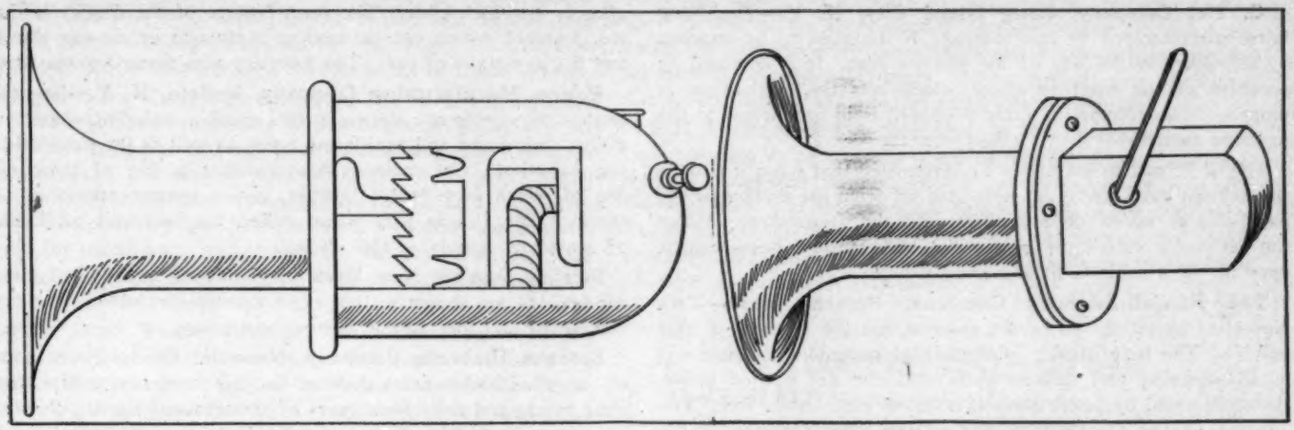
Hipwell vibrator

Typhoon vibrator



U. S. bulb-horn

Klaxon electric horn



Mechanism of the Typhoon horn

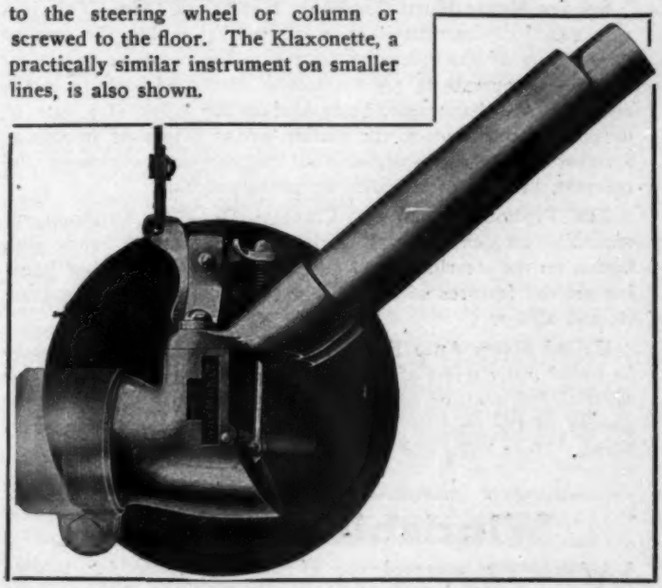
Exterior of the Jaco horn

C. M. B. Wrench Company, New York City—Acting as New York State agents of the Hepwell Manufacturing Company, of Pittsburg, the above-named concern is exploiting the Hepwell Autophone, an electric sound signal operated by a push-button placed on the steering wheel within reach of the driver's thumb and enabling him to use both hands at all times in the guidance of the car. All working parts of the Hepwell are sealed and waterproof, and its operation levies but lightly upon the car's batteries. It is extremely simple in its interior mechanism.

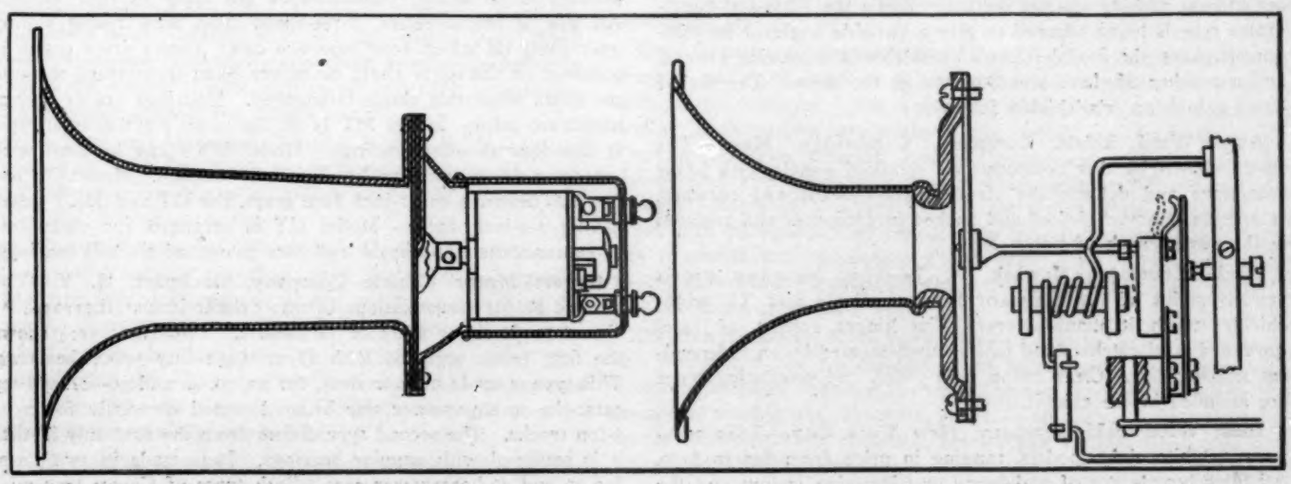
Dean Electric Company, Elyria, Ohio—The principal feature of the Tuto electric horn is that it gives two distinctly different sounds—a low note for regular service being produced by light pressure on the push button, located on the steering wheel in juxtaposition to the driver's thumb, and a loud, long-range warning resulting from heavy pressure on the button. A neat metal cord-protecting fixture is furnished with each horn, thus allowing of cleaning the steering column without damaging the insulation of the wires.

Gabriel Horn Manufacturing Company, Cleveland, O.—The general characteristics of the Gabriel horn are too well known to require description here. The exhibit at the Garden comprises the company's standard types of single and multiple-note musical signals, the latter forming pleasing chords. The volume of sound emanating from these instruments, while not penetrating, travels long distances. A pedal controls the operation of the exhaust gases to and through the instruments, though hand control can be arranged for. The Gabriel Rebound Snubber and Gabriel Windshield Cleaner are also shown here.

Lovell-McConnell Mfg. Company, Newark, N. J.—Giving the short, sharp warning so necessary in an automobile signal, the Klaxon line is displayed in an exhibit in keeping with its growing popularity. The sound waves are produced by the violent and rapid vibrations of a tough chrome vanadium disk. These vibrations are caused by a hardened toothed rotor striking against a hard button riveted in the center of the diaphragm, the rotor being keyed on the shaft of a small electric motor, the current for which is supplied by eight dry cells or a 6 to 8-volt battery. The operating button is clamped to the steering wheel or column or screwed to the floor. The Klaxonette, a practically similar instrument on smaller lines, is also shown.



Appearance of the Waymaker horn



Cross-section of the Sonora horn

Cross-section of the Tuto horn

G. Piel Company, Long Island City, N. Y.—The Long horn manufactured by this company is designed to be attached by a bracket to the side of the driver's seat. It is operated by pressure of the hand or elbow which sets the mechanism in motion. The volume of sound produced is in proportion to the pressure applied.

The G. P. muffler cut-out is so constructed that when it is open the exhaust gases are completely shut off from the muffler by the valve-tongue which deflects them into the atmosphere. When the cut-out is closed the pressure of the exhaust gases cannot open it. It is made to fit any exhaust pipe.

The Randall-Faichney Company, Boston, Mass.—Two high-class horns, driven by the exhaust, are the features of this exhibit. The tone of the Jubilee signal resembles a chime. It is self-cleaning and has no parts that can get out of order. Being operated by pedal control, it leaves both hands free. The Jericho, of the whistle type, has all the other features of the Jubilee.

Smalley-Daniels Company—The Waymaker Horn is made in two types known as the foot-controlled and the hand-controlled. It is operated by the exhaust gases of the motor and may be controlled readily from the driver's seat. In the hand-driven type the bulb may be attached anywhere on the wheel. When the valve is released the sound will be in proportion to the speed of the car.

Sonora Motor Horn Company, New York City.—This is a new signal device, placed upon the market within the past 90 days. It is of the electric type, the motor requiring but 2 3-4 amperes to operate it. A flat spring, placed an inch from the center of the diaphragm, beats against the latter at a rate of thirty thousand times to the minute, giving a tone as smooth as a steam whistle and possessing all the necessary sharpness and carrying qualities of the ideal automobile signal.

The Typhoon Signal Co., Chicago, Ill.—The Typhoon automobile signal embodies all of the latest patents. A handy push button on the steering wheel and aluminum weatherproof housing are the features of this horn, which is driven by a separate electric motor.

United States Auto Horn Company—In this exhibit are to be found many styles of bulb horns in round and oval bell, conical tube and question mark designs. One of the features is the placing of the reed in the middle of the tube on a number of horns.. Horn bulbs and reeds are also shown.

Windshield Section

WITH the increased use of the automobile for touring purposes the windshield must necessarily be more and more introduced to protect the driver from the violence of the air current rushing against the car. While the glass-and-metal-frame type is being adapted to give a variable angle of its component panes, the flexible class of windshields is gaining ground, and a number of them are displayed at the show. The list of firms exhibiting windshields follows:

Auto Wind Shield Company, Cambridge, Mass.—The shield shown by this company has celluloid panels with brass trimmings and deflects the air currents upward and outward. It may be removed, folded and packed in 5 minutes and replaced in the same length of time.

Eagle Company, Newark, N. J.—This company shows various styles of the Standard Friction, Eagle and XL windshields which it manufactures. The hinges consist of case-hardened steel ratchets and pawls, supplemented by an independent friction disk. Clear vision, rain vision and ventilating types are included in the exhibit.

Ideal Windshield Company, New York City.—This company exhibits eight models, ranging in price from $25 to $100. All filler boards are of mahogany or Circassian walnut and the glass is 3-16-inch plate. The main feature of the display is the No. 7 shield, which can be used as a straight or zig-zag shield and fits any make of car. The company also manufactures tops.

Polson Manufacturing Company, Buffalo, N. Y.—Several models of shields are shown in this exhibit, including the clear vision, rain vision and ventilating types, as well as the plain folding varieties. The company also exhibits a line of bumpers, one of which is a double bumper, giving greater resistance to shocks. The Polson jiffy wheel puller, for removing all kinds of gears and wheels, is also shown.

Smalley Daniels, New York City.—Three types of Boreas windshields are shown in this exhibit, the plain folding, the top ventilating and the top and bottom ventilating.

Sprague Umbrella Company, Norwalk, Ohio.—Five models of windshields are exhibited by this company, comprising clear vision and rail vision types of straight and zig-zag shields. The features of the display are the little giant shield and the new combination shield with ventilating adjustment. The company also shows a line of tops.

Troy Carriage Sunshade Company, Troy, Ohio—This company has divided its line of windshields into two parts, the first comprising four models, ventilating, zig-zag, down draft ventilating and a special design for torpedo bodies. The second division consists of six light models, including combination straight and zig-zag, straight, zig-zag and light torpedo special designs. The company also shows a number of pneumatic instruments.

Union Auto Specialties Company, Brookville, Pa.—A very full line of shields go to make up this exhibit, comprising straight, zig-zag, rain vision, double-folding, ventilating and torpedo designs. All shields have patented automatic lock. Plate glass is used with mahogany filler board and brass frame.

Transmissions and Gears

SPEED-CHANGE gearsets have undergone no fundamental changes in design, but improvement has been in the direction of applying better material for the gears, reducing the weight of the gearbox proper and adapting the set for center control. There were almost a dozen sets exhibited, as follows:

Brown-Lipe Gear Company, Syracuse, N. Y.—The feature of this exhibit is the unit clutch and gearbox with Raybestos versus steel clutch and 3 1-2 per cent. nickel-steel gears. Annular or roller bearings are furnished as desired. The purchaser may also have his choice of control, the right, left or center types being provided. The company also shows a new 60-horsepower truck transmission beside its usual line.

Buda Company, Chicago, Ill.—While this company's main product is its motor, transmissions are made in four models. All are of the selective, three-speed type, with round sliding gear shaft on which four keys are cast. Direct drive clutch is mounted on the spline shaft, no power being transmitted through the gears when this clutch is engaged. Housings are of special aluminum alloy. Model MT is of the usual right control type. It has four die-cast bearings. Model MXT can be used with center or side control and has four ball bearings. Model OT has five ball bearings and 1-inch face gears, the MT and MXT gears having 3-4-inch faces. Model UT is arranged for right, left or center control and has 1-inch face gears and six ball bearings.

Covert Motor Vehicle Company, Lockport, N. Y.—The feature of the transmissions in this exhibit is that they are designed to fit either axles or jackshafts. Two types are shown, the first being equipped with Hyatt high-duty roller bearings. This type is made in four sizes, for 20, 30, 40 and 50-horsepower cars, the 50-horsepower size being designed especially for 2 or 3-ton trucks. The second type differs from the first only in that it is equipped with annular bearings. It is made in two sizes, for 30 and 40-horsepower cars. Both types of Covert transmis-

sions have heat-treated, carbonized nickel-steel gears and shafts ground to limits of 1-500 inch. In the Covert unit transmission plant the gearbox is combined with the rear axle. All transmissions are of the selective type, three speeds forward and reverse.

Lefever Arms Company, Syracuse, N. Y.—Both selective and planetary types are shown in this exhibit. Model 1 is of the selective type for cars up to 45 horsepower and has three speeds forward and reverse with direct drive on high. Model 20 is of the three speed selective type for trucks up to 40 horsepower. The planetary type is represented by a three-speed transmission for trucks up to 35 horsepower. All gears used are 3 1-2 per cent. nickel-steel, specially heat treated. Right, left or center control is furnished as desired.

Muncie Gear Works, Muncie, Ind.—The feature of the transmissions made by this company is that the face width of the gears are increased in proportion to the strain imposed. Three sizes of three-speed selective type transmissions are made, for 20, 30 and 40-horsepower cars. Bearings are optional, New Departure, Hyatt, Bower or F. & S. being furnished.

A. O. Smith Company, Milwaukee, Wis.—This company makes a selective, three-speed transmission for cars of 25 to 50 horsepower. Imported annular ball bearings are used. The sliding gear shaft is of high-carbon stock, hardened and ground. It is square while the countershaft is round, of open-hearth steel. The pinion and transmission shafts are tapered.

Warner Gear Company, Muncie, Ind.—Transmissions for pleasure cars from 15 to 60 horsepower are shown in this exhibit as well as for 1 1-2, 2, 3, 5 and 7-ton trucks. All are of the selective type, made with either three or four speeds forward and reverse, in unit with the clutch or separate.

Warner Manufacturing Company, Toledo, O.—In this exhibit two sizes of selective transmissions are shown, in both rear axle and sub-frame types. The smaller is for cars of 30-35 horsepower and the larger for cars of 40-50 horsepower. Both are of the three-speed selective type forming a unit with the power plant. One truck transmission, bolted direct to jackshaft or rear axle, is also exhibited. Chrome-vanadium, heat-treated steel gears are used with either aluminum or malleable housings.

Exhibitors of Tools

TURNER Brass Works, Sycamore, Ill.—Designed especially for garage use, the Turner hot-blast brazing machine attracts much attention among repairmen. Either gasoline or kerosene may be used for fuel, the air being contained in a 10-gallon seamless steel tank with air pump and air gauge. After the burners are lighted the machine works automatically, throwing powerful flames from the two burners, which can be concentrated on a single point or used independently.

Tucker Tool & Machine Company, New York City—At this stand are exhibited full lines of Billings & Spencer wrenches for automobile work; Wright wrenches for similar uses; Reed machinists' vises and Yale & Towne chain blocks. Included in the latter is the electric triplex hoist in 1-2 and 1-ton capacities—a device especially suitable for garage work.

Noonan Tool and Machine Works, Rome, N. Y.—Chisel and punch sets, including from ten to eighteen pieces to a set, and packed either in boxes or rolled leather kits, form the exhibit of the Noonan company.

Coes Wrench Company, Worcester, Mass.—A full line of heavy wrenches suitable for shop work and 4, 6 and 12-inch wrenches especially designed for a road outfit are shown at the Coes stand. Wrench sets for repair kits are featured.

Clucker & Hixson Company, New York City.—The McKaig combination drop-forged pliers feature the exhibit of this concern. They bear the title "Sure Cutters," their efficiency in that respect being specially emphasized.

Frank Mossberg Company, Attleboro, Mass.—One of the most comprehensive exhibits of wrenches to be seen at the show is that of the above-named company, which includes these handy devices for every conceivable use in connection with the adjustment of automobile parts. As in former years, the Auto-Clé socket wrench, in large and small sets, is featured.

J. H. Williams & Co., Brooklyn, N. Y.—Wrench sets, specially adapted to automobile work, of various shapes, sizes and weights, constitute the exhibit of the above-named company. Some of these sets are provided with openings milled for United States and S. A. E. standard nuts and cap screws for severe service. The Vulcan auto tool, which is adapted to a dozen different operations, is also shown.

General Supplies

J. ALEXANDER Manufacturing Company, New York City.—The manufactures of this company comprise microscopes, connectors, switches, robe rails, dash lamps, license pads, tire holders, individual wind and storm screens, etc. The wind and storm screen is about 14 inches in diameter and is composed of fine screening in a circular brass frame, which may be mounted on the steering column. The individual windshield differs from the screen only in that glass is used instead of screening and that brass side-braces are provided.

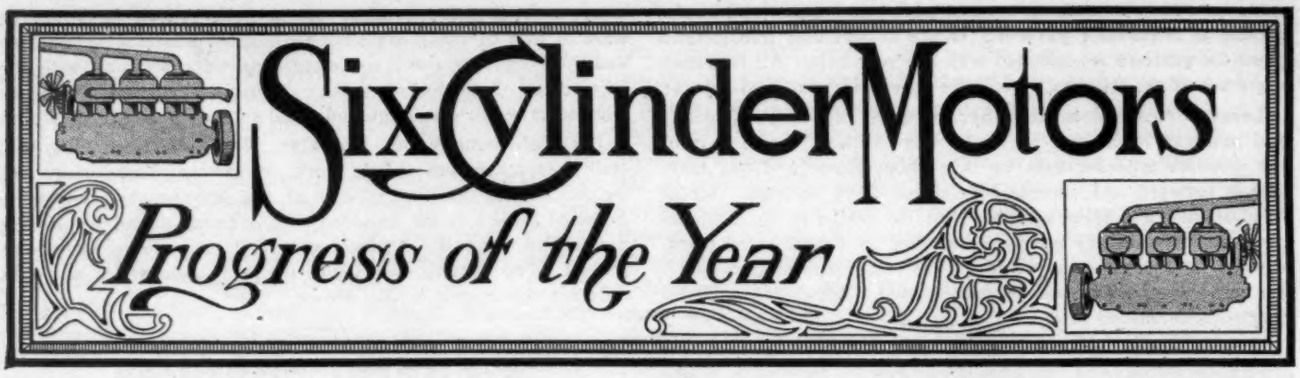
Cox Brass Manufacturing Company, Albany, N. Y.—The display of this company's line of brass automobile specialties is very elaborate. Windshields, in seven models, compose the main exhibit. All are of the clear vision type and some have the ventilating feature. Straight, zig-zag and torpedo models are included. The company also shows a number of bumpers of various designs. Windshield frame rods and bumper rods are doubly reinforced with steel tube and V-section steel rod, which makes them very durable. Glass used in the shields is 1-4-inch plate and is inserted in a rubber channel, which prevents rattling. The company also manufactures a large number of tools and sundries.

Eclipse Specialty Company, New York City—This company exhibits an extensive line of sundries, including bumpers, brake-linings, tire holders, gasoline torches, pedals, lamp brackets, spark-plugs, windshield cleaners, etc. The bumpers are all of the Eclipse clamp-attached type. The windshield cleaner is called the Security cleaner and cleans the entire surface of the glass. It is operated with one hand and is guaranteed not to rattle.

Garage Equipment Manufacturing Company, Milwaukee, Wis.—This company exhibits a large line of windshields, bumpers, vulcanizers, tire holders, muffler cut-outs, tools and sundries. The windshields constitute the leading feature and are made in many attractive models. The Gemco fore-door car ventilator consists of two small brackets which, when attached to the dash, convert an ordinary windshield into one of the ventilating type.

Emil Grossman Company, New York City—A large assortment of tools and sundries of various makes constitute the exhibit of this company. The Vanguard windshields, which are a display in themselves, are made in five models and many sizes. The line includes straight, zig-zag, clear view straight, rain vision clear view straight and rain vision zig-zag. The hinge is silent, dustproof and positive and the finish of the shield is brass with mahogany filler board. The newest Vanguard shield has provision for ventilating a fore-door car. Among other things shown in the exhibit are the Autobestine brake lining and the Red-Head spark-plug.

Charles E. Miller, New York City—Owing to lack of space this company's line of supplies could be shown only in part. The line includes bearings, batteries, brakes, carbureters, commutators, crankshafts, dynamos, gears of all sorts, lamps, magnetos, mufflers, pumps, radiators, spark-plugs, springs, tires, tops, valves, windshields, etc.



BACK in 1905 the number of makers of six-cylinder automobiles in America could be counted on the fingers of one hand. A search through old files reveals the fact that there were in that year two prominent concerns who were offering a machine of this size to the public. These pioneers were the Stevens-Duryea Company and the National Motor Vehicle Company, the latter concern having discontinued six-cylinder manufacture after 1909. For this year there are approximately forty-four makers who have undertaken to market sixes whereas there were only thirty for 1911.

Reference to the chart will give some idea of the rapid strides which this motor has made in 10 years. History of automobile six-cylinder motors in this country dates from 1905, in which year the two concerns mentioned first courageously put out their six model. As shown by the curve, the increase was rapid from that year to 1908, when there appears to have been a cessation of activity along the line of developing the motor. The increase was very small from that time until 1910, when new impetus seems to have been given to its manufacture, and from this time until the present the number of concerns adopting a six model has been rapidly on the rise.

Perhaps one reason which may be advanced for the slow increase in the number of six makers between these two years is that other improvements commanded the attention of the designers and engineers to the exclusion of considerations of a greater multiplicity of cylinders. During this period, improvements in body design, carbureter construction, magneto manufacture, spring suspension, motor refinements and the like occupied the center of the stage and the engineers were too absorbed in these problems to worry about the adding of more troublesome cylinders. But all these things had been more or less perfected during this time, so that, with no other all-absorbing consideration on their hands, they returned to the six-cylinder problem, with the result that last year the number of six manufacturers jumped to thirty and the increase was correspondingly large this season.

Credit for the six-cylinder design is generally given to England, though it is apparent from the records that the first vertical motor of six cylinders was the Gasmobile, built in this country and exhibited at the New York Show of 1901. About 2 years later (1903) the six-cylinder Napier appeared in England, and the present popularity of the six is, perhaps, due in no small measure to that car's energetic manufacturer, S. F. Edge. But in the interval between the coming of the Gasmobile and the Napier car, the Standard Motor Construction Company designed a six-cylinder motor. This appeared in the last 2 months of 1902, and the firm had it running in a boat in the spring of 1903.

Yet, so sure were the American automobile manufacturers of that period that the one- or two-cylinder motor was the ultimate one that they paid little attention to these newcomers into the field. They failed entirely to appreciate the numerous advantages of more than two cylinders, and, whereas the opportunity was theirs, they left it to the foreign makers to develop the motor, the popularity of which is increasing rapidly.

The latest additions to the six-cylinder field are notably the Packard Motor Car Company, the Chalmers Motor Company, the Metzger Motor Car Company, all of Detroit, Mich.; Apperson Bros. Automobile Company, Kokomo, Ind.; and the White Company, Cleveland, Ohio.

The following tabulation is very interesting, since it shows how the number of six makers has increased year by year:

CHRONOLOGY OF SIX-CYLINDER TYPES

Trade Name	Firm Name	First Yearly Six Model	Remarks
Alco	American Locomotive Co.	1908	
Apperson	Apperson Bros. Automobile Co.	1912	
Bartholomew	The Bartholomew Co.	1908	Discon'd same year
Berkshire	Douglas Andrews Co.	1906	
Cameron	Cameron Car Co.	1907	
Chadwick	Chadwick Engineering Works.	1908	
Chalmers	Chalmers Motor Co.	1912	
Corbin	Corbin Motor Vehicle Corp.	1908	
Everitt	Metzger Motor Car Co.	1912	
Fiat	Fiat Co.	1912	First Am. model
Ford	Ford Motor Co.	1906	Discontinued 1907
Franklin	H. H. Franklin Mfg. Co.	1906	
Garford	Garford Co.	1911	
Havers	Havers Motor Car Co.	1911	
Kisselkar	Kissel Motor Car Co.	1910	
Kline Kar	Kline Motor Car Corp.	1911	
Knox	Knox Automobile Co.	1910	
Locomobile	Locomobile Co. of America	1911	
Lozier	Lozier Motor Co.	1908	
Matheson	Matheson Automobile Co.	1908	
Mitchell	Mitchell-Lewis Motor Co.	1907	
National	National Motor Vehicle Co.	1905	Discontinued 1909
Oldsmobile	Olds Motor Works.	1908	
Packard	Packard Motor Car Co.	1912	
Palmer & Singer	Palmer & Singer Mfg. Co.	1908	
Peerless	Peerless Motor Car Co.	1908	
Pierce-Arrow	Pierce Arrow Motor Car Co.	1907	
Pope-Hartford	Pope Mfg. Co.	1911	
Premier	Premier Motor Mfg. Co.	1908	
Stevens-Duryea	Stevens-Duryea Co.	1905	
Stoddard-Dayton	Dayton Motor Car Co.	1911	
Thomas	E. R. Thomas Motor Car Co.	1908	
White	The White Co.	1912	
Winton	Winton Motor Carriage Co.	1908	

There are a number of other manufacturers of six-cylinder motors about whose production information of this nature was not available.

Few Six Makers Have Discontinued Production

A glance at this tabulation will show that there are only three concerns which have discontinued the production of six-cylinder motors once they have undertaken their construction. These firms are the National Motor Vehicle Company, the Ford Motor Company and the Bartholomew Company. While the National company was among the first to make a six in this country and while their product was nearly half composed of cars equipped with six-cylinder engines up to 1910, they have dropped all six models and are devoting their entire energies to the construction of fours. They state that from their experience they have never been able to get the same efficiency out of a six as out of a four. The Ford company discontinued their six-cylinder model in 1907, and, while they are not adverse to the six, are leading advocates of a small four. The Bartholomew Company does not expect to make a six in the future, but propose to devote their attention to four manufacture. Aside from these

three makers the six is not only holding its own but has gained ground at the rate of a 46.6 per cent. increase for this year over the preceding year.

Yet, in the face of this very large American increase, perhaps, one of the most striking features of last fall's Berlin Show was the entire absence of six-cylinder cars. Not a single German exhibitor showed a car of this type, the only one which was exhibited being an English Daimler equipped with a six-cylinder Knight motor.

American Makers Falling in Line

Many of the older American manufacturers have held off from the marketing of a six engine until it has entirely passed the experimental stage, and are now gradually taking it up. They have waited until they knew that it was an assured and practical power plant, and until they were sure that the demand was great enough to warrant their producing it. But most of them have added it to their line reluctantly, knowing that it meant the rearranging and reconstruction of costly special machinery, and that its manufacture involved new engineering details of construction with which they were none too familiar. The way in which they have worked out these details is very commendable. All have gone at the peculiar six-cylinder problems from different angles, and, whereas the minor details of construction and arrangement are not the same, there is a striking similarity of fundamental design to be noticed in this year's models. This would indicate that designers are nearly all of the same general opinion as to what makes for the best in a motor, and the time is not far distant when standardization will be even more in evidence. This is to be expected, since, if these thinking men are working on the right track, there should be no variation in the fundamentals of design.

The tabulations on pages 170 and 171 represent the majority of six-cylinder motors, both foreign and American, for this year, and while there are a few manufacturers from whom information was not available, the list is very comprehensive. While the dimensions of foreign engines are usually given in millimeters, they have been reduced to inches in order to afford a means of comparison with the American motors.

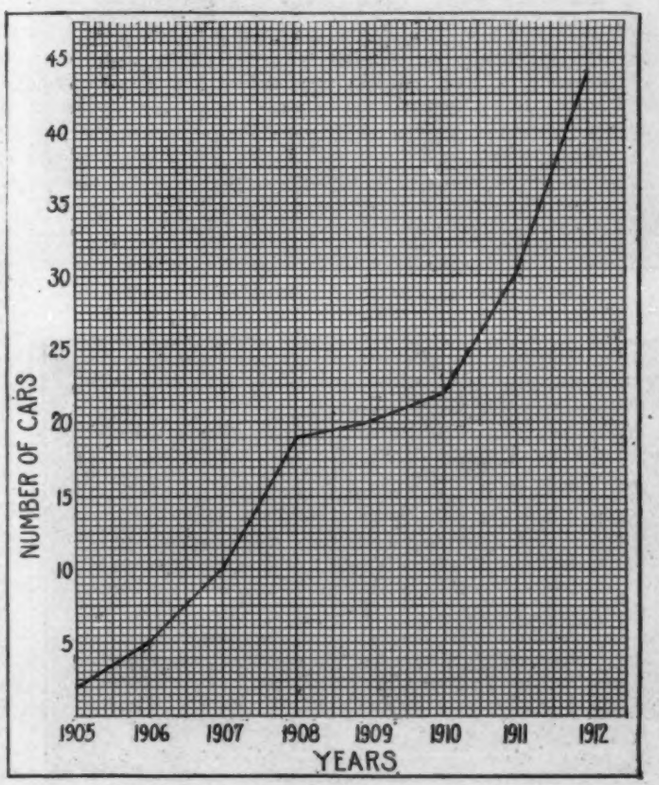
A glance at the horsepower columns in the two tables reveals the fact that the horsepower of the average European car is considerably below that of the American. Most of these foreign sixes have from 20 to 35 horsepower, while the lowest powered car in the American list has a rating of 29.4 horsepower. The average American car has between 40 and 60 horsepower and many of them run a great deal higher. It is true that there are high-powered sixes built abroad, for example the 90-horsepower Napier, but this is rather the exception than the rule. One important reason for this great difference lies in the fact that the American road conditions are very much worse than they are in Europe, and if the machine is required to negotiate the poorer roads with any sort of speed it must have power. There is a general antipathy in this country to the use of the gearshift. This may be given as another reason why the American cars have the higher power. If his car will not take any sort of hill or bad road on high gear the owner is disgusted with it and envies the man whose car will do these things. Recognition of this has led the wise manufacturer to put a great amount of excess power into his product as a selling factor, if for no other reason. Then, again, there is either a very low or no horsepower tax in this country. So far as car tax is concerned, it is nearly as cheap here to own and operate a six-cylinder machine as it is to run a two-cylinder one. Not so in England. The making of high-powered machines is rather discouraged by the horsepower tax, which runs up very high on them. And so the six-cylinder automobile with a rating of 15 horsepower, which would, no doubt, be considered a freak and a failure in this country, is not to be wondered at abroad.

There does not seem to be a great deal of variation in the bore-stroke ratio, although if anything the average on the other side is slightly higher than here. This is largely due to the fact that European engines have about the same stroke length as our own, and, since the cylinder bores are usually smaller, the ratios become greater.

Another interesting comparison may be drawn between the length of wheelbase of domestic and foreign cars of the six-cylinder type. The average American six-cylinder touring car has a wheelbase of from 130 to 140 inches, or even higher, while that of the European six is lower, ranging usually from 120 to 135 inches. Of course, there are larger foreign cars, but in the main they range around 130 inches. Four- or five-passenger bodies seem to be the rule abroad for sixes also, while the average six of American manufacture with touring body will carry seven comfortably. This is to be expected and follows naturally from the use of higher powered engines.

Perhaps one of the widely varying features of the present six-cylinder motor design is the manner of casting the cylinders. In the early days of six manufacture the practice was almost universal to cast them separately, while since then various ways of casting them together have been developed. At the present time there are a number of makers who cast them in pairs, in threes, or they even go so far as to cast the entire six in one block. There are three examples of this latter practice—the Everitt, the Fiat and the White. The Franklin air-cooled motor is the only one under consideration which has the cylinders cast separately. In this case it is obviously done in order to get the greatest possible amount of exposed cooling surface. The new Stoddard-Dayton Knight motor has its cylinders cast in blocks of three, while the majority of the other makes are cast in pairs. Therefore, it may be truthfully said that in current American practice the average six-cylinder motor is of the type which has the cylinders cast two together.

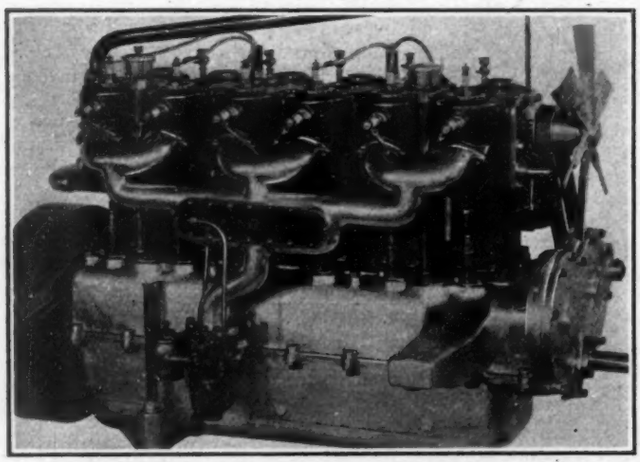
There seems to be no overwhelming argument in favor of any one of these four combinations over the other three, although the question of weight might be an argument in favor of the lesser number of separate castings. The greater the number of individual castings the greater the combined weight of the motor. Thus, the motor having all its cylinders cast



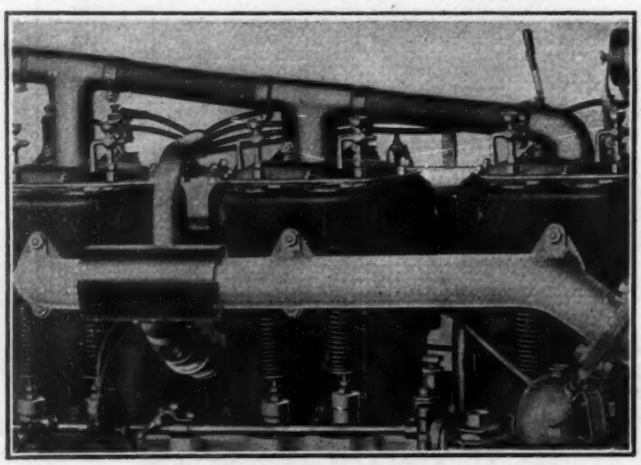
Curve showing increase in American sixes since 1905

in one block would weigh considerably less than the one having them cast singly, in pairs or in threes. On the other hand, the six-cylinder monobloc motor would, of necessity, be crowded for bearing room, and the bearings would have to be shorter than for any of the other three types. This offers a slight objection, as the bearings should be as long as possible in order to aid in the elimination of whipping stresses which tend to cause the motor to vibrate and to prevent its smooth running. Of course, this may be gotten around by making the bearings larger, and the crankcase heavier. The less the number of cylinder castings the simpler the manifold piping becomes, which is an advantage both to the manufacturer and the purchaser. The water manifolds can be constructed so as to have a single inlet and a single outlet, the exhaust pipe can be simplified and the number of openings for the inlet manifold connection can also be greatly reduced. Further, the fewer the number of castings the shorter the overall length of the motor becomes. And so, while the monobloc construction has its disadvantages, it also has its commendable features, and as usual the designer is between a number of fires. It does not seem that monobloc will become universally popular due to the extreme difficulty incurred in making so intricate a casting. This, of course, is from the manufacturing standpoint.

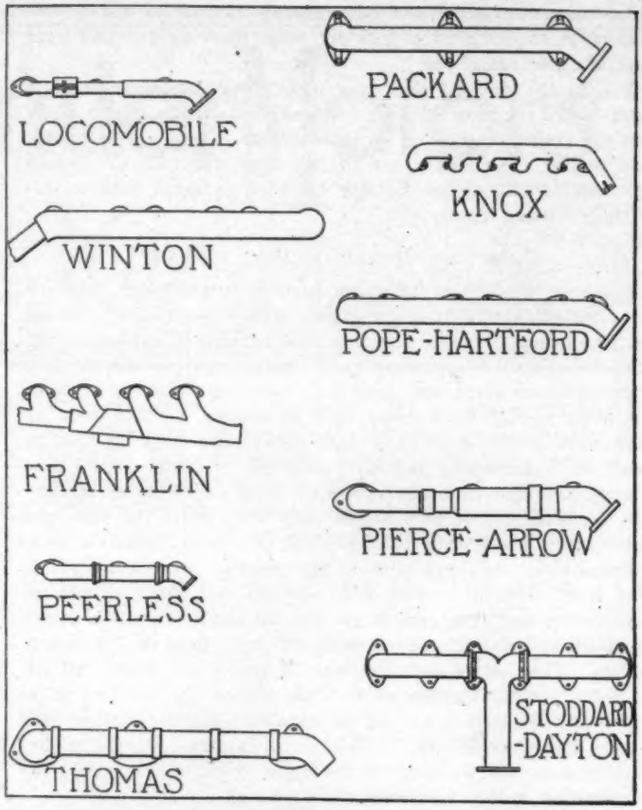
It is also very evident that when several cylinders are cast integrally the boring and machining can be done with extreme accuracy, thus insuring nearly perfect cylinder alignment. Such absolute alignment is not possible when the cylinders are cast in any other way. As against this greater care must be exercised against scoring the cylinder walls or against damaging them in any other way, as any injury of this kind means not



Intake side of Kline 6-50 motor, showing peculiar manifold



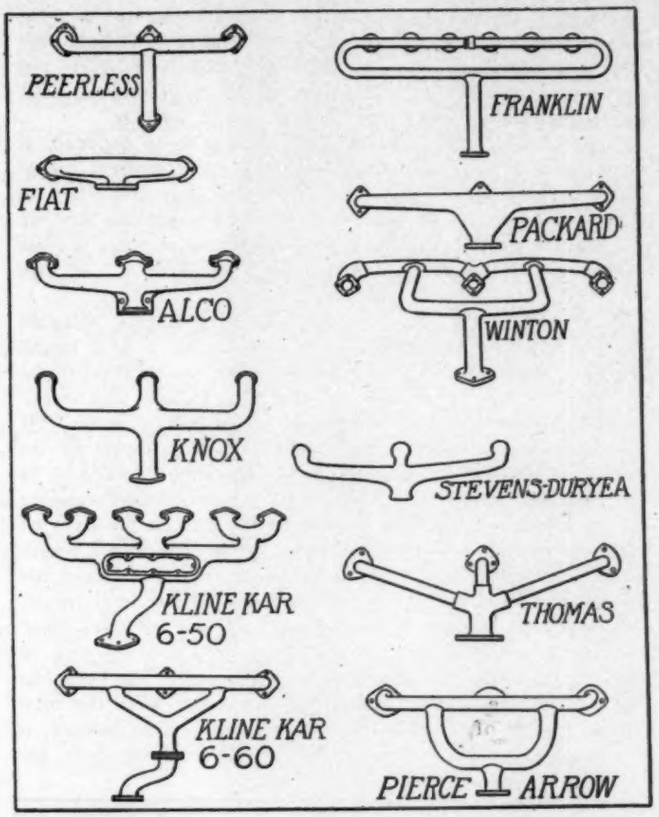
Exhaust side of new Packard six motor



A group of exhaust manifolds, showing American tendencies

AMERICAN CARS

Name and Model	Bore, Inches.	Stroke, Inches	Piston Displacement, Cu. In.	Horsepower	B-S Ratio
Alco 60	4¾	5½	585.1	54.1	1.16
Apperson Six	4.5	5	477.2	50	1.11
Auburn 6-50	4½	5½	420.9	40.9	1.27
Austin 77	4½	7	668.0	48.6	1.55
Austin 50	4½	6	572.6	48.6	1.33
Berkshire E	4 11/16	5½	569.4	58.5	1.17
Cameron 30 & 32	3⅞	3½	265.4	36.1	0.967
Chadwick 19	5	6	706.8	60	1.20
Chalmers 12	4½	5½	446.7	43.8	1.24
Coey 1912	4	5	377.0	38.4	1.25
Everitt 6-48	4	4½	358.2	38.4	1.19
Fiat Six	4 2-5	6	547.0	50	1.36
Franklin M	3⅛	4	247.6	31.6	1.10
Franklin D & H	4	4	301.6	38.4	1.00
Garford G-14	4½	5½	420.9	40.9	1.24
Great Eagle 6-60	4½	5½	420.9	40.9	1.27
Havers 6-44	3⅞	5	331.4	33.8	1.33
Kisselkar 60	4½	4½	453.3	48.6	1.05
Kline Kar 6-50	4½	5	394.5	40.2	1.22
Kline Kar 6-60	4½	5½	524.9	43.8	1.22
Knox S	5	4½	559.5	60	0.95
Locomobile M-2	4½	4½	429.5	48	1.00
Locomobile R	4½	5	425.4	38	1.18
Lozier 51	4⅝	5½	554.4	51.6	1.19
Matheson 50	4½	5	477.2	48.6	1.11
McFarlin 40-45	4	5	377.0	38.4	1.25
McFarlin 55-60	4½	5	426.4	43.8	1.17
Midland O	4.36	5	447.0	45.5	1.15
Mitchell 5-6	3⅞	5½	364.4	33.8	1.47
Mitchell 7-6	4½	5	477.2	48.6	1.11
Oldsmobile Limited	5	6	706.8	60	1.20
Packard Six	4½	5½	524.9	48.6	1.22
Palmer-Singer 6-40	4	5	377.0	38.4	1.25
Palmer-Singer 46	4	5	377.0	38.4	1.25
Palmer-Singer 6-60	4⅞	5½	615.9	57.0	1.13
Peerless J	4	5½	414.8	38.0	1.37
Peerless K	4½	6	572.6	48	1.33
Peerless L	5	7	824.9	60	1.40
Pierce-Arrow 36-R & 36-T	4	5½	386.4	38.4	1.28
Pierce-Arrow 48-R & 48-T	4½	5½	524.9	48.6	1.22
Pierce-Arrow 56-R & 66-T	5	7	824.9	60	1.40
Pope-Hartford 28	4½	5½	584.9	44.6	1.16
Premier M-6	4½	5½	501.0	48.6	1.17
Pullman 6-60	4½	5½	524.9	48.6	1.22
Stevens-Duryea AA	4½	4½	404.1	43.8	1.12
Stevens-Duryea Y	4½	4½	478.5	54.1	0.95
Stoddard-Dayton Knight	4½	5½	524.9	48.6	1.22
Suburban Limited	3½	4½	259.8	29.4	1.29
Thomas 6-40	4½	5½	468.0	43.8	1.29
White	4½	5½	489.5	44	1.35
Winton 17C	4½	5½	524.9	48.8	1.22



Standardization has not extended to intake manifolds, as here shown

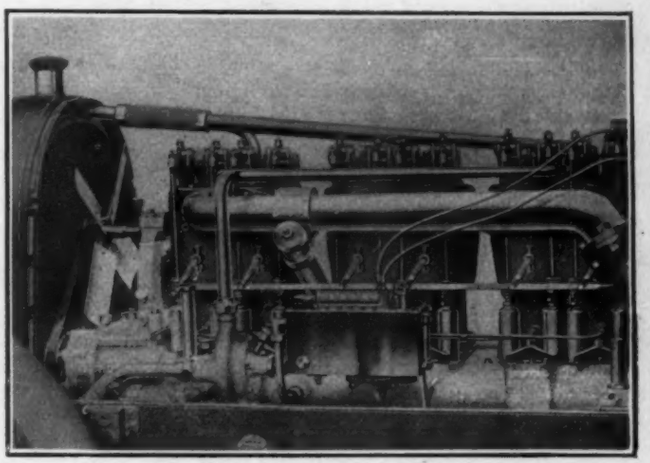
EUROPEAN CARS

Name and Model	Bore, Inches	Stroke, Inches	Horse-power	B-S Ratio
Adams 30	3.46	4.37	28.9	1.26
Alldays 30–35	3.74	4.53	33.6	1.21
Armstrong-Whitworth 30–35	3.54	5.31	30.2	1.50
Arrol-Johnston 24	3.15	4.72	23.9	1.49
Austin 50	4.33	5.00	50.0	1.15
Belsize 18–22	3.66	4.72	32.2	1.28
Berliet 35–45	3.94	5.51	37.2	1.40
Daimler 23	3.15	5.12	23.9	1.62
Daimler 30	3.54	5.12	30.2	1.44
Daimler 38	3.98	5.12	37.2	1.28
Deasy-Knight 24–30	3.54	5.12	30.2	1.44
Delage 15.9	2.56	4.96	15.7	1.94
Delahaye 18–24	2.95	4.72	20.9	1.60
Delaunay-Belleville 19	2.83	4.72	19.3	1.66
Delaunay-Belleville 26	3.35	5.12	26.8	1.53
Delaunay-Belleville 37	3.94	5.51	37.2	1.40
F.I.A.T. 20–30	3.15	5.12	23.9	1.62
Gregoire 18–30	3.15	4.72	23.9	1.49
Hotchkiss 25–35	3.74	5.12	33.6	1.37
Hotchkiss 40–50	4.33	5.91	45.0	1.37
Italia 60	5.00	5.52	59.9	1.10
Italia 75	5.52	5.52	72.9	1.00
La Buire 24	3.35	5.52	26.8	1.65
Lanchester 38	4.02	4.02	38.4	1.00
Leon Bolle 20–30	3.27	4.33	25.6	1.32
Leon Bolle 35–45	4.17	5.12	41.8	1.23
Maudslay 30	3.54	5.12	30.2	1.44
Motobloc	3.15	4.72	23.9	1.49
Napier 30	3.23	5.00	25.3	1.54
Napier 45	4.02	5.00	38.4	1.24
Napier 65	5.00	5.00	60.0	1.00
Napier 90	6.14	5.00	90.0	0.82
Panhard 18–24	3.15	4.72	24.8	1.49
Panhard 30	3.54	5.12	30.2	1.44
Renault 18	3.15	5.12	34.9	1.62
Renault 40	3.94	6.30	37.2	1.59
Rochet-Schneider	2.95	4.72	20.9	1.60
Rolls-Royce 40-50	4.45	4.69	47.3	1.05
Sheffield-Simplex 25	3.50	5.00	29.4	1.43
Sheffield-Simplex 45	4.49	4.49	48.3	1.00
S.P.A. 30–40	3.74	4.72	33.6	1.26
S.P.A. 60–70	5.12	5.71	63.0	1.11
Standard 20	3.11	4.72	23.2	1.52
Standard 25	3.50	4.25	29.4	1.21
Star 20	3.15	4.72	23.9	1.49
Sunbeam 25–30	3.54	6.30	30.2	1.78
Unic 25–35	3.35	4.72	26.8	1.40
Vauxhall 30	3.54	4.72	30.2	1.33
Vulcan	3.50	4.72	29.4	1.35
Wolseley 24–30	3.54	5.12	30.2	1.44
Wolseley 50	4.49	5.75	48.3	1.28

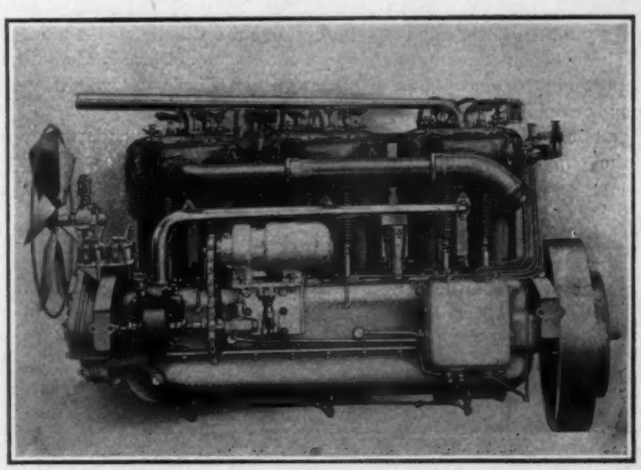
only the scrapping of the damaged member but the replacement of the entire six.

Another point of wide variation in the new six-cylinder models is in the number of crankshaft bearings. Several of the 1912 motors will have seven crankshaft bearings, but the majority of them will be equipped with four. The Everitt, which has the entire six cylinders in one block, makes use of a three-bearing crankshaft. The total bearing length for the average four-bearing motor seems to be about 14 inches, while the Franklin seven-bearing engine with cylinders cast separately has a total crankshaft-bearing length of 18 1-8 inches. The Everitt three-bearing shaft has a total bearing length of 10 1-4 inches, this wide difference bringing out what has already been said in connection with the manner of casting the cylinders.

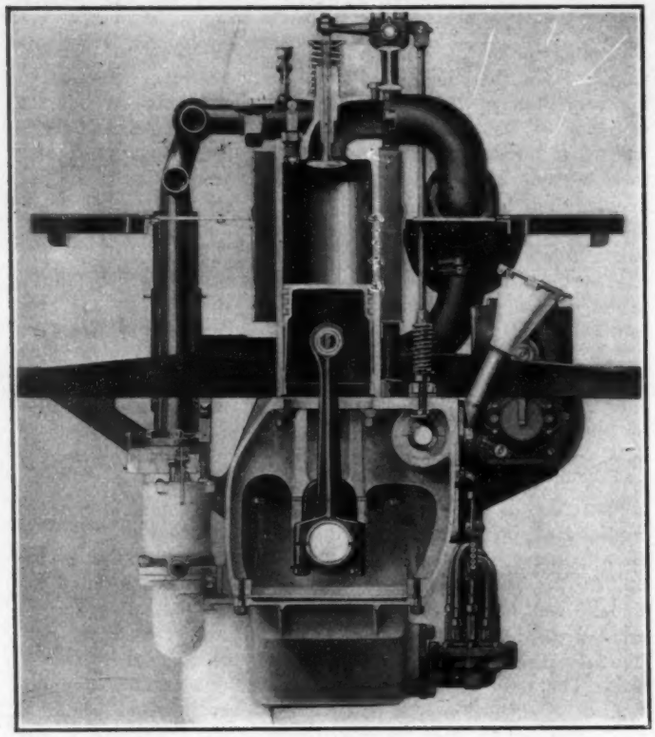
The tendency in Europe seems to be toward the use of seven bearings. In so designing their motors the foreign engineers have given no little attention to the problem of the elimination of the very small amount of vibration to which this type of engine is subject. The pistons and connecting-rods are naturally very accurately balanced, and any slight vibration which does occur is due to the very small bending which takes place in the crankshaft. Of course, a crankshaft which does not whip at all with every explosion in the cylinders is an impossibility, but the smaller these vibrations are the less noticeable they become. And so, in order to reduce them to the minimum, the greatest possible support must be given to the crankshaft. Substantial crankcases also help to reduce whipping-stress vibration. The most notable recognition of these facts is the new English Sheffield-Simplex motor. Its seven bearings are of a size never before used by this firm, and the crankcase is also



Pope-Hartford engine used on model 28



Left side of one of the latest Peerless engines



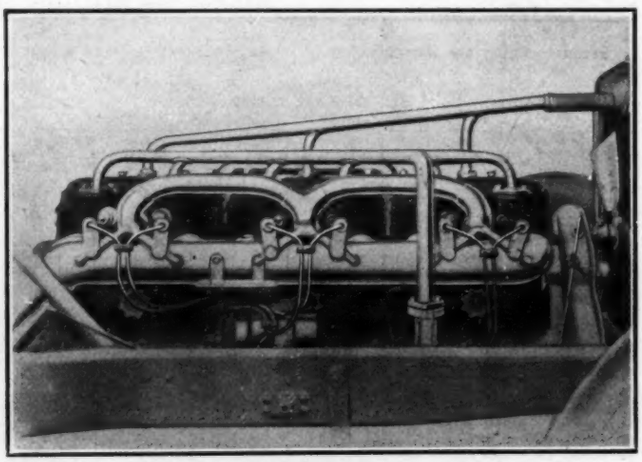
Side view of Franklin air-cooled six-cylinder motor

very strongly constructed. This new motor is very silent and smooth-running, but it is cumbersome. Thus, to get ultra smoothness and to have almost no vibration, light-weight motors must give way to much heavier ones, and compact motors must be sacrificed for those that are longer. The average American automobilist prefers the lighter, compact motor; hence the American manufacturer meets his demands with the four-bearing six. The small increase in silence and smoothness due to the use of the heavy motor does not seem to warrant its adoption. Indeed, it is hard to conceive of quieter or more smooth-running motors than some of the new models which have been put out for the American trade. They may not be the equal of the seven-bearing types from a purely mechanical standpoint, but they satisfy the American market, and that, after all, is one of the chief considerations.

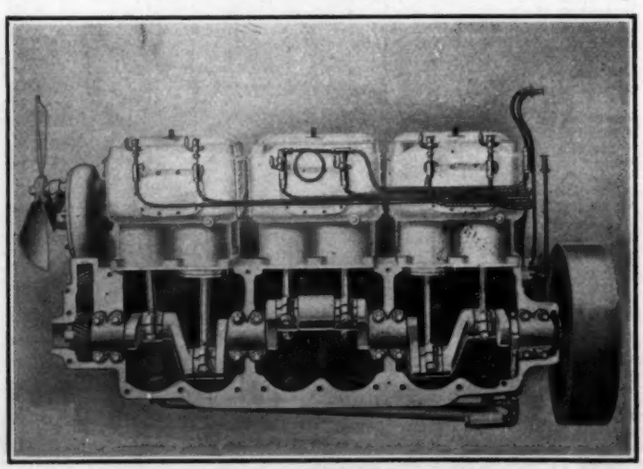
The firing order of American sixes differs to some extent, although the greater number of makers adhere to the more generally accepted order of 1-4-2-6-3-5. Out of twelve representative motors under investigation, nine have their cylinders firing in the order given above, while the Lozier has the order 1-2-3-6-5-4, the Winton 1-5-3-6-2-4 and the Chadwick 1-3-2-6-4-5. These three, together with one Peerless model, are perhaps the most notable exceptions to the more usual order. Ordinarily in six-cylinder crankshaft design crankpins 1 and 6, 3 and 4 and 5 and 2 are in line. With this fact in mind, and considering that the explosions follow one another at intervals of 240 degrees (two-thirds of a crank revolution), it is readily seen that the firing order 1-4-2-6-3-5 or its opposite, 1-5-3-6-2-4, is very logical, and its extensive use at the present time is justified. The object is to get successive power impulses as far apart as possible so that there will be no tendency to the formation of couples which would produce vibrations. That is, in jumping from cylinder 1 to cylinder 5, or in the other arrangement, to cylinder 4, and so on, these impulses are caused to counteract in so far as their vibration tendency is concerned. There are eight possible combinations which may be used to make up the firing order, but the alternations cannot be made so far apart with any of the other arrangements. This further emphasizes the theoetically correct trend of the majority of the new six-cylinder motors. Of course, there are arguments in favor of other firing orders, and the designers of motors which carry out their ignition systems in these different ways have no doube felt justified in using the combinations which they have adopted. Modern tendency does not favor their views, however.

Some form of dual ignition system seems to be included on practically all the sixes of the year, the manufacturers recognizing the advantages to be had from such equipment. Not all motors have two sets of spark plugs. It is a question whether the advantage to be gained from the use of twelve plugs is great enough to counterbalance the increased complication and care incident to the use of the additional six.

There seems to be no uniformity of motor lengths, although the average six-cylinder engine of this year has a total length from the front of the first cylinder casting to the rear of the back cylinder casting of from 37 inches to 40 inches. The overall lengths vary between the limits of 46 inches and 64 inches. Of course, these dimensions are governed to a large extent by the manner of casting the cylinders; as already stated. As is to be expected, the fewer the number of separate cylinder castings the less the total length of the motor. This is on the basis of the same cylinder bores. The latter governs the motor length to some extent, since it stands to reason that the larger the diameter of the cylinders the greater will be the total length. For these reasons there is really no logical basis for comparison as regards motor length. It is to be noted, however, that in cases where the same manner of cylinder casting has been employed and where the cylinder sizes are about alike the total overall lengths of the motors are about equal. For instance, if two motors have the same or nearly the same cylinder bore, say



View showing Winton manifold construction



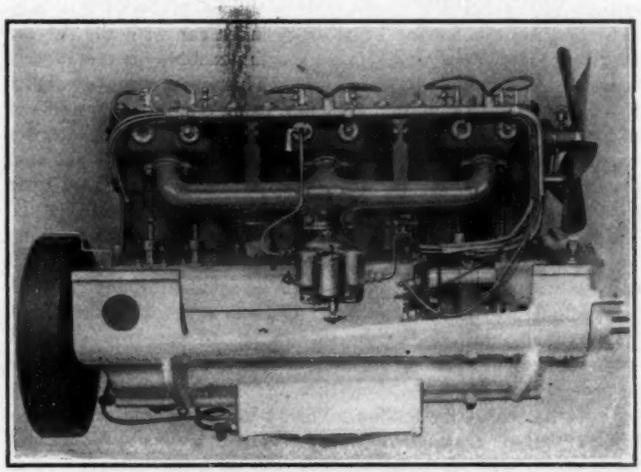
The Winton four-bearing crankshaft is here clearly seen

4 1-2 inches, and if each has its cylinders cast in pairs, the total distances from corresponding points on each will not vary by more than 1 or 2 inches. A similar parallelism can be shown for motors having like cylinder dimensions and having the cylinders cast in any one of the other ways already cited. With the ideas held at present as to motor design, this slight uniformity is to be expected.

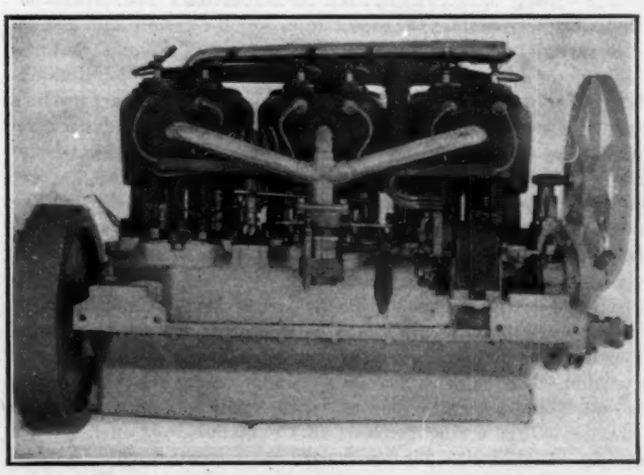
The compression pressure remains about the same, that almost generally used being about 65 pounds. This has been found by experience to be the most practical to use, and opinions of the designers appear to have remained unchanged as to it.

In the early days of the six-cylinder motor the construction of the manifolds was considered one of the hardest problems for the engineers. Various forms were devised, and most of them were only partially successful in getting a uniform charge into all six of the cylinders. Some tried the use of two carbureters instead of one with only mediocre results.

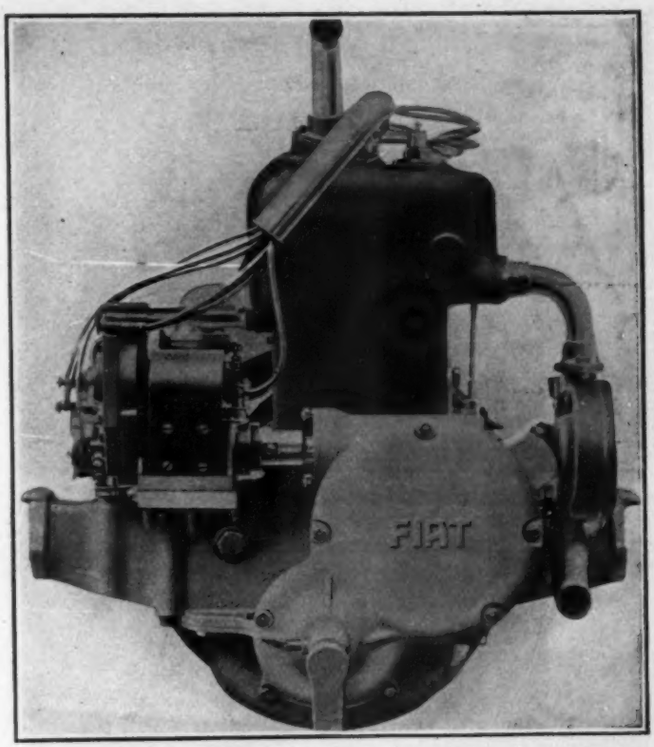
There are a number of conditions which make equality of distribution of the charge difficult. Bends in the piping and the valves rearrange the constituents of the explosive mixture in such a way that care must be taken to prevent the splitting up of the liquid and gas, and to insure equal amounts being carried to each of the cylinders. Various combinations of bends can be made so as to get nearly equal distribution, but in cases where more bends are added to counteract the effects of others, the resistance to fluid flow is necessarily increased. In some cases baffles or other forms of deflectors are interposed in the piping which leads to the cylinders nearest the carbureter to take the place of extra bends, but the total resistance offered is in no way lessened by this.



Right side of the Alco six-cylinder motor



Thomas motor having one set of spark plugs in sides of valve pockets

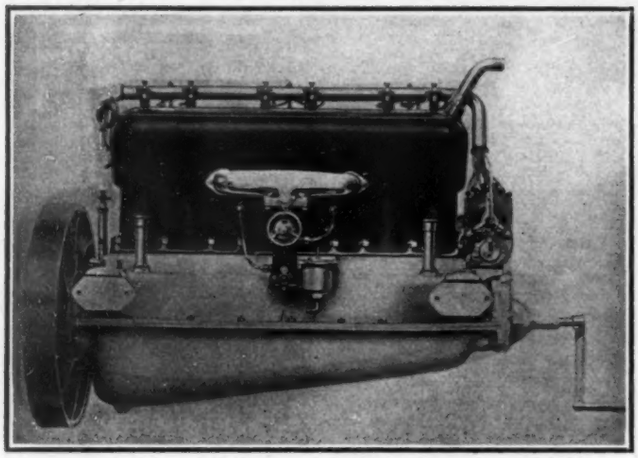


Side view of Fiat six, showing positions of magneto and pump

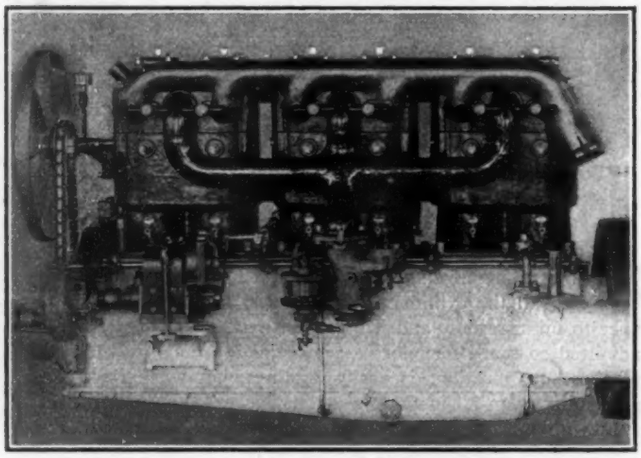
An intake manifold to be ideal must distribute the charge evenly to all the cylinders, it must offer no unnecessary resistance to mixture flow and it must not materially alter the charge admitted so that its explosive properties are impaired. Any one of these qualifications is easily obtained, but when it comes to combining them all in the one piping system the numerous difficulties already mentioned enter.

With these considerations in view, it is of interest to notice the various ways in which some of the prominent manufacturers have eliminated as far as possible the objectionable features of manifold construction and have embodied the desirable ones. A sketch illustrating a number of manifolds on the new cars will be found herewith. It will be seen that the majority shown have three cylinder connections. One of the most interesting is that of the Kline Kar model 6-50, which has a detachable cover plate, admitting of the adjustment or replacement of the special form of deflector used. Connections are also made to each of the cylinders in this design. On the Winton cars the carbureter and intake ports are on opposite sides of the motor, the piping passing over the tops of the cylinders. Equal distribution here is seen to be accomplished by the manner of connecting the piping without the use of deflectors. Perhaps one of the simplest is that of the Fiat motor. The connections to the cylinders are two in number, distribution from these points being taken care of within the casting itself. Aside from all other considerations, this lends a very simple and neat appearance to the motor. Similar to the Fiat construction is that of the Everitt, which also presents simplicity. The Franklin manifold is of very peculiar form, a connection to each of the cylinders being necessary since they are cast separately. All the other forms illustrated present the same general idea of admitting the mixture to the cylinders at three points. While manifolds of this latter form are simpler, provision must be made within the piping for deflectors, and whereas the more complicated type has more bends, it does not require these resisting devices. Therefore, it is doubtful if one form has any advantages over the other.

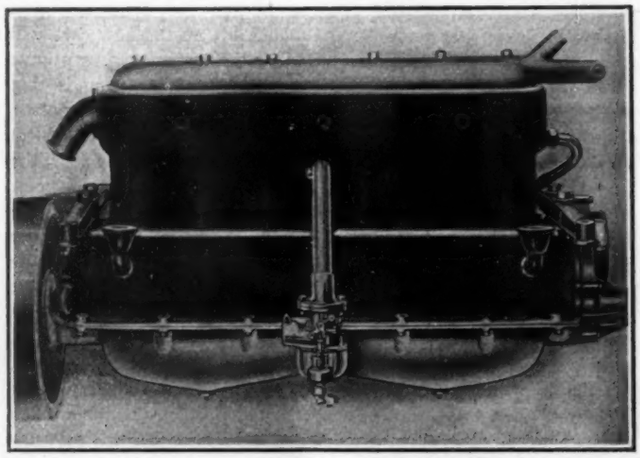
Exhaust manifolds do not differ to any great extent, except in the number of connections to the cylinder castings. This is true of all those shown in the accompanying sketch with the excep-



Intake side of the Fiat monoblock six-cylinder engine



The Knox exhaust manifold is placed above the intake manifold



Showing the intricate monoblock casting of the Everitt six

tion of the type adopted on the new Stoddard-Knight engine. In this design it will be noticed that the outlet to the muffler is connected at the center instead of at the end as in the more usual form.

The building of a six-cylinder motor is not merely a matter of adding two extra cylinders to an existing four-cylinder type. In view of this fact, the opinions of several members of the trade may be of interest.

Mr. A. M. Dean, engineer for the Matheson Automobile Company, says: "To realize the smooth running qualities characteristic of a six-cylinder motor, the question of exact mechanical balance has to be worked out to a nicety. The engine cases must be of a very deep section and must be rigidly constructed so as to overcome the tendency of the long crankshaft to whip. The question of proper gas and water distribution for the six is a more difficult proposition than with the four. Cooling is another problem which is more difficult than with the four, as the frontal area of radiation cannot be greatly increased over that allowable for the four-cylinder motor of the same cylinder dimensions, on account of considerations of appearance."

The opinion of Mr. G. H. Bryant, of the Franklin Automobile Company, as to this is that if you should merely add two extra cylinders, that is, if you should make your construction as heavy in a six-cylinder motor as in a four-cylinder one of the same power, you would not be gaining the advantages which should be gained by six-cylinder construction. In other words, a 30-horsepower six-cylinder motor, taking this as a concrete example, built according to this idea would be just half again as heavy as a four-cylinder 30. He states that the idea should be to build a six-cylinder 30 which would have about the same weight as a four-cylinder 30, but which would have the added flexibility that the more even torque of the six cylinders would give it.

Mr. W. J. Ward, of the Winton Motor Carriage Company, says, in part: "It will be readily recognized that if when designing a motor you start with the idea of building a certain type, and lay out all your details with this idea in view, results may be obtained which cannot be secured by converting one type into another after the design details have been completed."

Other Opinions on Six-Cylinder Operation

Comparing the driving of a six-cylinder car with the driving of a four, Mr. Ward says, "The six-cylinder motor is remarkably more flexible than is any other type. This is shown in its ability to run more slowly on high gear and to pick up speed faster and more easily. The driver who is compelled to shift gears in order to run his car at very low speed in traffic, and to shift again in order to accept an opening that may occur ahead, is called upon to do work which in the six the motor does for him. The six, running on high gear, can be throttled down to a man's walking pace, and it can be caused to pick up speed in response to opened throttle with a rapidity which cannot be equaled by any car with less cylinder. The six is superior to other types in hill-climbing. In climbing a hill the motor is required to perform increased work, because it must propel the car and passengers the distance of the ascent and at the same time lift the entire load from the base to the top of the incline. The reason why a six will take a hill on high gear which a four of equal total horsepower cannot take, why it will reach the summit without a preliminary run at the bottom or pounding at the top, is because it has a reserve power—power which is not used until required. For, since continuous power enables the motor to propel the car on high gear at less speed than that required on the four, it follows that the high motor speeds of the six are always available for hill climbing or for fast going on the level. Thus, beauty of performance combines with economy of operation—a much to be desired result. The effect of these points of superiority upon the driver are apparent."

Mr. F. C. Clark, of the Cameron Car Company, says: "The multiplicity of impulses received from a six-cylinder motor can be compared only to some steady power, such as electricity. The six runs without noise or jerk."

The advertising manager of the Lozier Motor Company is of the opinion that the difference between the driving of a four-cylinder and a six-cylinder car depends entirely upon the car in question. He states that a four-cylinder motor can be designed to work and operate smoothly with small vibration and with constant effort, giving better results than those obtained from a poorly designed six-cylinder motor. A properly designed six, he believes, will be found to handle a little easier in traffic and on hills, and also that, while the difference between the two is not

great, automobile design has come to such a point that even the slightest variations are of great account, and a difference of two cylinders is more than a slight variation.

From the Metzger Motor Car Company the following is of note: "While our four and six-cylinder motors are designed along similar lines, the castings are entirely different, as are the intake and exhaust manifolds, the valve timing and the size and angle of the crankshafts. A different balance is also required, both as to the motor itself and as to its action in the chassis. In fact, a six is, throughout, an entirely different engineering and mechanical proposition.

"The perceptible advantages of a six lie in its greater flexibility, with consequent wide range of speeds on direct drive, the continuous power developed, the ability to get under way quickly and the extreme efficiency on the hills. Mechanical advantages include ease on tires and mechanism, better balance and long life of parts."

From these views the consensus of opinion is that the six has greater hill-climbing ability, greater flexibility and more smoothness. While the opinions in one or two cases may be slightly biased, they are largely borne out, and there seems to be little question but that a properly designed six is superior to a four. Each year has seen the further improvement of the six and an increase in its popularity. It would seem that this once-ridiculed type of motor is rapidly coming into its own.

Robbing the Muffler of Its Smell

The now very general crusade against the open muffler is due to a two-fold defect of this device: the noise and the bad smell. As regards the noise, this can hardly be obviated if the muffler is cut out. It therefore remains to do away with the often-abused cut-out. Referring to the smells, however, it must be said that cutting out the silencer only accentuates the odors and that an ordinary muffler, even if not cut out, is unable to fully prevent them.

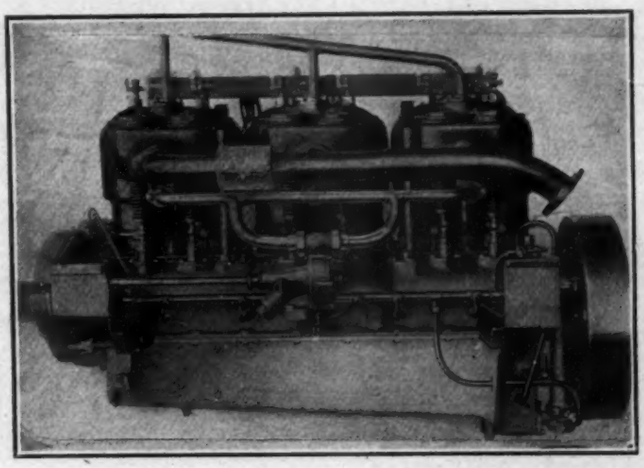
The problem of annihilating the disagreeable smell which has made so many enemies for the automobile is easier than is generally suspected. Various remedies have been proposed; for instance, the admixture of perfuming essences to the exhaust, but reasoning and experience are unanimous as regards the inefficacy of this plan.

There are three efficient ways of solving the problem. The first solution consists in completely oxidizing unburned components of the exhaust gases by adding to them, before they enter the muffler, a sufficient quantity of air to burn the free hydrocarbons to carbonic acid and water. If properly carried out, this idea should prove very effective; but if too much air is mixed with the waste gases the nitrogen prevents the combustion of the unburnt gases. If too little air is used the comparatively small oxygen content will not mix with the gases without materially increasing the back pressure exerted upon the motor.

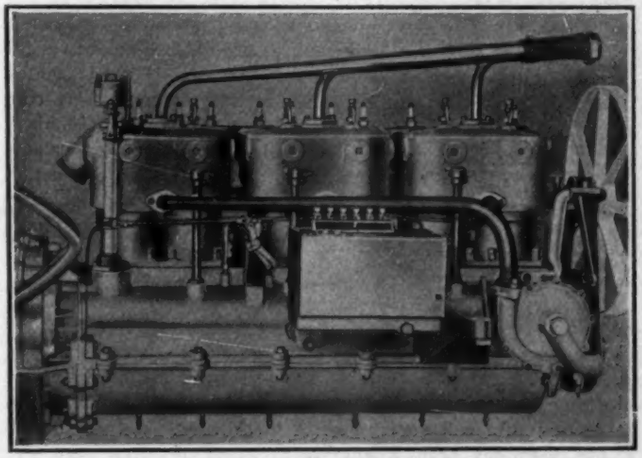
The second possibility lies in the application of a catalyzer; that is, a substance the presence of which accelerates the process of combustion. In using this principle the exhaust gases, together with a quantum of air, are led over a surface covered with oxide of copper. After this material has been heated by the exhaust gases to a temperature of about 300 degrees Centigrade it will greatly quicken the combustion of the unburnt components of the exhaust.

The catalyzer must be located in the muffler, and if the latter is so constructed as to radiate a minimum of heat, a perfect combustion of the waste gases may be brought about without difficulty. This system has only one setback—it is not effective until the motor has been run for a little while and the muffler has been heated to the above-mentioned temperature by the exhaust. Furthermore, the life of a catalyzer is limited, because the sulphuric and nitrose gases always contained by the exhaust gases go to poison the copper oxide and take away its faculty to work in the manner described. If it were not for these two detrimental influences of the chemicals just named, the problem would be solved.

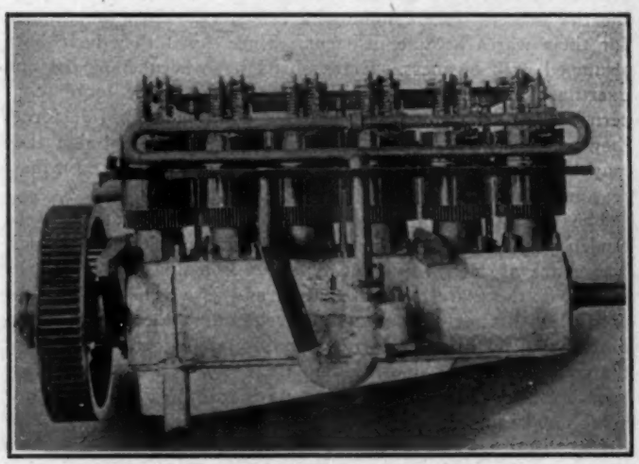
The third possibility of robbing the exhaust gases of their smell is by leading them through a filter vessel filled with oil or certain acids. There is no difficulty in constructing a compact and efficient filter of this kind, and if, after some months of service, the liquid has become ineffective, it could be replaced in almost no time and at a minimum of cost.



The Locomobile motor. The water outlet piping is of note



The Stevens-Duryea six-cylinder unit power plant, model AA



The Franklin air-cooled motor presents unusual features

THERE are sixteen companies of national size and importance engaged in the manufacture of pneumatic tires for automobiles in the United States. There are at least as many more concerns that turn out material numbers of tires, and the small fry number possibly two-score. The total production of tires in this country is not far from 3,600,000 annually, basing the estimate on the use of 600,000 automobiles at a consumption rate of six tires a year for each car.

In money terms this means about $140,000,000 for casings and $65,000,000 for inner tubes, or close to $200,000,000 all told.

The year 1911 will go down in automobile history as the greatest in point of volume of business since the beginning of motoring and there is a unanimous expression of opinion in the trade that 1912 will go far beyond the current year.

The year has been wonderful in many respects. Starting under rather gloomy auspices and under pessimistic circumstances because of a similar feeling in the automobile industry, the tire makers were caught with low stocks when the demand for their wares became insistent. Since April they have been swamped with business. Extra shifts have been employed and overtime has been the general rule. Some of the larger concerns declare that by working day and night with full forces they will be able to keep up with the procession and that they may be able to catch up with their orders during the winter season.

The most noticeable development of the year has been the tendency toward expanding the use of non-skidding treads. There are as many different types of non-skid treads on the market as there are makers of tires and as a general thing the production of non-skids bears the relation to the total production of two to three, or forty to sixty. It is a notable fact that the counter sales of non-skidding treads in New York City are probably in excess of 60 per cent. of the total sales. The same holds good in a slightly less proportion in other cities. The apparent discrepancy is accounted for by the fact that few makers of cars equip their stock models with non-skids. As a general proposition the maker sells his product with plain-tread tires and when replacements are required the owners purchase non-skids in sufficient quantities to raise the proportion to about two-fifths.

Tire prices during the year have been lower than they were in 1910, in the face of the increased business and demand. This is largely the result of lower crude rubber, the current price of which is practically one-third of what it was in April, 1910. Naturally, the high level was manipulated and the failure of the Brazilian scheme of valorization caused the rubber bubble to collapse like a toy balloon. The present level is about $1.07 a pound for fine up-river Para and the total production indicated for the year is in the neighborhood of 500 tons greater than it was during the foregoing period. The world's commercial sales of rubber for 1911 are estimated at 36,000 tons in round figures. These figures present what seems like a paradox because the commercial movement of rubber in the fiscal year of 1910 was over 50,000 tons. The explanation lies in the fact that a large amount of rubber held in pools was released by the high prices and the subsequent break in 1910. The world's stock of crude rubber is estimated at 80,000 tons.

The outlook for the rubber supply is hopeful and optimistic, based largely upon the prospects of the yield of the Malaysian and Polynesian plantations. It is estimated that by 1916 the yield of plantation rubber will be 65,000 tons a year. The total production of the world at present is less than that amount annually.

During the past 3 months the shipments from Para and Manaos have increased materially and in September they were larger even than they were in September, 1910. Prices, however, seem to have reached bottom and despite the increased receipts the market is strong and slightly higher.

The American tire industry, represented by automobile pneumatic tires and tubes, requires not far from 20,000 tons of high-grade crude rubber to supply its needs this year. Valued on a basis of $1 a pound, this means an expenditure of $40,000,000 for crude rubber that goes into tires. The estimate is liberal as to tonnage.

Another factor that would seem to exert an influence on the tire market is the marked break in cotton prices as compared with those of last year. The commercial grades of cotton are approximately 6 cents lower than they were, or a reduction of over 40 per cent.

Practically every company engaged in tire making issues carefully prepared literature at stated periods advising customers in the proper use and treatment of tires. Among the points dealt with particularly are: Air pressures, over-sizes, anti-skids, normal load weights and retreading and repair.

Long Tire Wear Benefits Maker

From a short-sighted viewpoint it might seem that the quicker a customer wore out a set of tires the better it would be for the tire-maker. On closer view, however, the logic of that situation disappears. In the first place, excessive cost of tire mileage is accomplished in two ways—by the high cost of the tires originally and by the small mileage delivered. If a set of tires costs $200 and delivers only 1,000 miles, the per mile cost is 20 cents, while if it delivers 10,000 miles, the cost is only 2 cents. At 2 cents a mile for tires there would be vastly more motoring proportionately than there would be at 20 cents a mile. Consequently it is to the advantage of the tire makers to bring down the cost of tire mileage.

In the matter of oversizes, all the companies agree that a larger tire, giving a larger air cushion, is better than a smaller tire with a smaller air cushion. They all recommend the oversize tire as a means to increase tire mileage and reduce tire cost. In this respect the companies go into painstaking detail. For instance, the following tabulation framed by the Firestone company is an example showing what oversize tires will fit standard rims:

31x3½-in.	Regular clincher	fits 30x3	-in. rim
31x4 -in.	Regular and quick detachable clincher	fits 30x3½	-in. rim
33x4 -in.	Regular and q. d. clincher and q. d. cable base	fits 32x3½	-in. rim
35x4 -in.	Quick detachable clincher	fits 34x3½	-in. rim
37x4 -in.	Quick detachable clincher	fits 36x3½	-in. rim
35x4½-in.	Regular clincher	fits 34x4	-in. rim
37x4½-in.	Quick detachable clincher	fits 36x4	-in. rim
35x5 -in.	Regular and quick detachable clincher	fits 34x4½	-in. rim
37x5 -in.	Regular and quick detachable clincher	fits 36x4½	-in. rim
39x5 -in.	Quick detachable clincher	fits 38x4½	-in. rim
37x5½-in.	Regular and quick detachable clincher	fits 36x5	-in. rim
39x6 -in.	Quick detachable clincher	fits 38x4½	-in. rim
43x5 -in.	Quick detachable clincher	fits 42x4½	-in. rim

The Firestone company does not guarantee any more miles from oversize tires than it does from regular equipment and with very few exceptions the same rule is followed by other makers. As a general rule the guarantee is for 3,500 miles by the average tire manufacturer. In a few cases it is over that figure, and in several there is no definite guarantee. The majority of the leading manufacturers stipulate 3,500 miles, but the Pennsylvania company makes it 4,000 miles for its nonskidding type of tire and the Ajax guarantees 5,000 miles for all varieties included in its stock.

Under the guarantee, adjustments are made based upon the difference in mileage delivered by a tire and its guarantee, always providing that the cause for failure to deliver the guaranteed mileage can be charged to the tire itself and not to neglect, carelessness or accident.

The Fisk company recommends the use of large tires where indicated by the load to be carried, as follows:

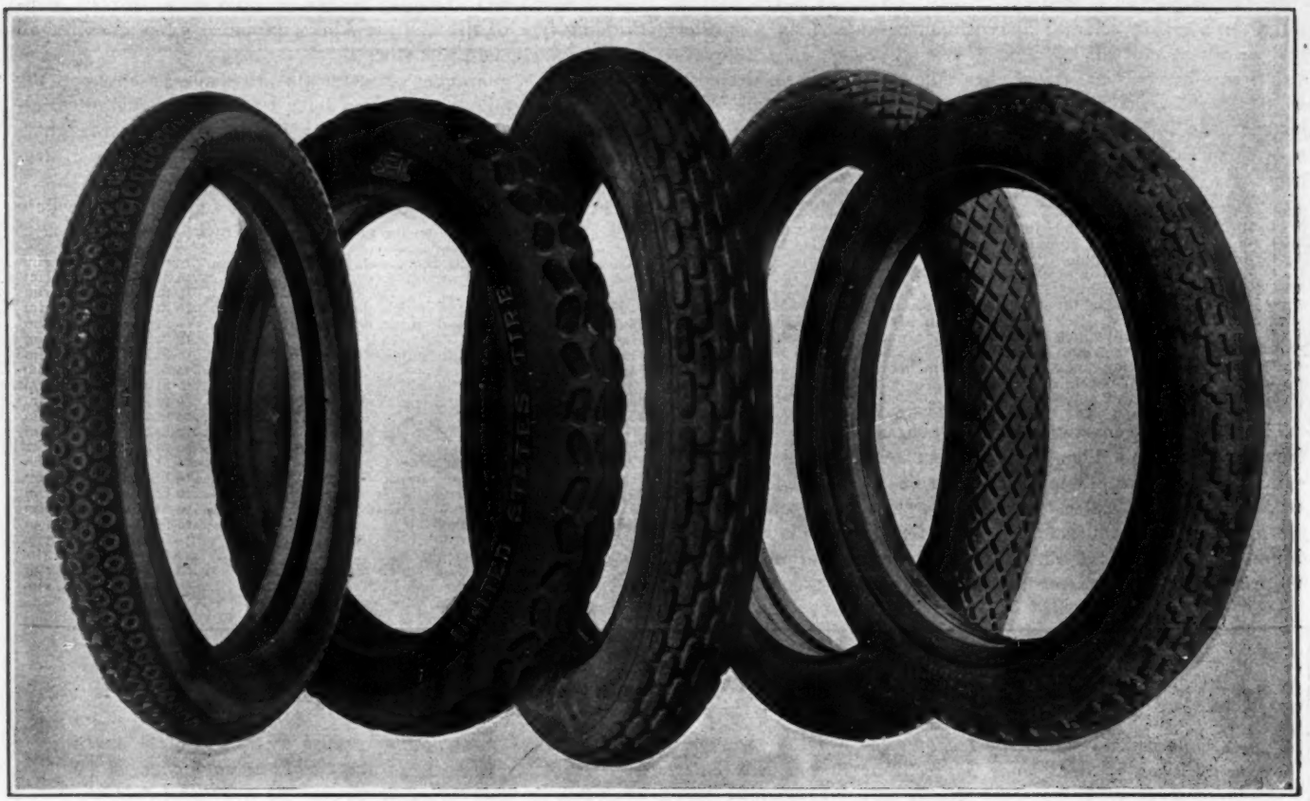
28x3¼-inch	Bolted-on tire	to fit 28x3	-inch rim
29x3½-inch	Clincher and quick detachable	to fit 28x3	-inch rim
30x3¼-inch	Bolted-on	to fit 30x3	-inch rim
31x3½-inch	Clincher and quick detachable	to fit 30x3	-inch rim
33x3½-inch	**Clincher and quick detachable**	to fit 32x3	-inch rim
31x4 -inch	Bolted-on	to fit 30x3½	-inch rim
31x4 -inch	Clincher and quick detachable	to fit 30x3½	-inch rim
31x4 -inch	Dunlop	to fit 30x3½	-inch rim
33x4 -inch	Bolted-on	to fit 32x3½	-inch rim
33x4 -inch	Clincher and quick detachable	to fit 32x3½	-inch rim
33x4 -inch	Dunlop	to fit 32x3½	-inch rim
35x4 -inch	Clincher and quick detachable	to fit 34x3½	-inch rim
35x4 -inch	Dunlop	to fit 34x3½	-inch rim
37x4 -inch	Quick detachable	to fit 36x3½	-inch rim
35x4½-inch	Clincher and quick detachable	to fit 34x4	-inch rim
35x5 -inch	Clincher and quick detachable	to fit 34x4½	-inch rim
37x5 -inch	Clincher and quick detachable	to fit 36x4½	-inch rim
39x5 -inch	Quick detachable	to fit 38x4½	-inch rim
41x5 -inch	Quick detachable	to fit 40x4½	-inch rim
36x5½-inch	Quick detachable	to fit 34x4½	-inch rim
37x5½-inch	Clincher and quick detachable	to fit 36x5	-inch rim
38x5½-inch	Quick detachable	to fit 36x4½	-inch rim

Table of Tire Inflation Pressures and Maximum Loads

The accompanying table shows the inflation pressures and maximum loads to be carried by each of the more usual sizes of tires made by well-known tire companies. In those cases where a larger weight is countenanced by the makers upon the front wheels as compared with the driving wheels, that figure is given. As a general rule the rear wheels are supposed to carry from 50 to 250 pounds less per wheel than those in front, depending on the size of the tires. But most of the figures given herewith are average load figures and should be regarded as absolute maximum for the various sizes. In the matter of inflation it may be noted that if the load carried is less than maximum, the inflation may be slightly reduced. But it should be constantly borne in mind that there is little to gain by doing this and if any mistake is made there is much to lose.

STANDARD SIZES		Ajax	Fisk	Firestone	Goodrich	Goodyear	Republic	Michelin	Diamond	Penna	U.S. Tire Co.	Shawmut
28x3...	I	65	60	50	65	60	50	50	60	50	60	60
	W	425	300	350	425	425	400	400	425	425	425	350
30x3...	I	65	65	50	65	60	50	60	60	50	60	60
	W	450	400	350	450	450	400	560	450	450	450	350
32x3...	I	65	65	50	65	60	50	60	60	50	60	60
	W	450	400	350	450	450	400	560	450	450	450	350
34x3...	I	65	65	50	65	60	50	60	60	55	..	60
	W	475	400	350	475	475	400	560	500	500	...	350
36x3...	I	....	....	50	....	....	....	60	60	....	....	60
	W	....	....	350	....	....	....	500	500	....	....	350
29x3½..	I	70	....	....	70	....	....	....	70	50	70	70
	W	500	....	....	500	....	....	....	525	500	500	425
30x3½..	I	70	60	60	70	70	60	50	70	60	70	70
	W	550	400	450	550	550	500	600	550	550	550	450
31x3½..	I	70	65	60	70	70	....	....	70	60	70	70
	W	550	500	500	550	600	....	....	575	550	575	500
32x3½..	I	70	65	60	70	70	60	60	70	60	70	70
	W	600	500	550	600	600	700	700	625	625	600	555
33x3½..	I	70	65	60	70	70	60	....	70	....	70	....
	W	600	500	575	600	600	700	....	650	....	625	....
34x3½..	I	70	70	60	70	70	60	70	70	65	70	70
	W	650	600	600	650	600	700	800	675	675	650	600
35x3½..	I	70	70	60	70	70	60	....	70	....	70	....
	W	650	600	600	625	600	700	....	700	....	675	....
36x3½..	I	70	75	60	70	70	60	70	70	65	70	70
	W	700	700	600	700	600	700	800	750	750	700	600
37x3½..	I	70	....	60	70	....	....	....	....	....	....	....
	W	750	....	625	725	....	....	....	....	....	....	....
31x4...	I	75	....	75	75	....	70	....	80	60	80	80
	W	750	....	625	750	....	800	....	775	675	775	600
32x4...	I	75	65	75	75	80	70	70	80	65	80	80
	W	800	600	650	800	650	800	1000	800	800	800	650
33x4...	I	75	70	75	75	....	70	....	80	65	80	80
	W	850	700	650	850	....	800	....	825	800	850	675
34x4...	I	75	70	75	75	80	70	75	80	70	80	80
	W	875	700	700	875	750	800	1100	875	875	875	700
35x4...	I	75	75	75	75	....	70	....	80	70	80	80
	W	875	800	725	875	....	900	....	900	875	885	725
36x4...	I	75	75	75	75	80	70	75	80	70	80	80
	W	900	800	750	900	750	1000	1100	900	900	900	750
37x4...	I	75	75	75	75	....	70	....	80	70	80	....
	W	900	800	800	900	....	1000	....	950	900	915	....
33x4½..	I	80	....	85	80	....	80	....	90	....	90	90
	W	1000	....	750	1000	....	1300	....	1050	....	1000	750
34x4½..	I	80	80	85	80	90	80	80	90	70	90	90
	W	1125	1200	900	1125	800	1300	1300	1125	1125	1125	800
35x4½..	I	80	80	85	80	....	80	....	90	70	90	90
	W	1200	1200	950	1200	....	1300	....	1200	1125	1175	850
36x4½..	I	80	80	85	80	90	80	80	90	70	90	90
	W	1225	1200	1000	1225	900	1300	1300	1250	1250	1225	900
37x4½..	I	80	85	85	80	....	80	....	90	....	90	....
	W	1300	1250	1100	1300	....	1400	....	1300	....	1260	....
38x4½..	I	80	85	85	80	....	....	....	90	70	90	....
	W	1300	1400	1200	1325	....	....	....	1350	1375	1300	....
40x4½..	I	80	85	85	80	....	....	....	90	75	90	....
	W	1375	1400	1250	1375	....	....	....	1400	1450	1350	....
42x4½..	I	80	85	85	80	....	....	....	90	75	90	....
	W	1450	1600	1300	1450	....	....	....	1450	1450	1450	....
35x5...	I	85	....	90	85	....	85	....	100	70	100	100
	W	1250	....	1000	1250	....	1600	....	1350	1250	1250	900
36x5...	I	85	80	90	85	100	85	80	100	75	100	100
	W	1300	1400	1000	1300	1000	1600	1600	1375	1375	1300	1000
37x5...	I	85	85	90	85	100	85	....	100	75	100	100
	W	1350	1500	1100	1350	1000	1600	....	1400	1375	1350	1100
39x5...	I	85	85	90	85	....	....	....	100	....	100	....
	W	1450	1600	1200	1450	....	....	....	1500	....	1450	....
41x5...	I	85	85	90	85	....	....	....	100	....	100	....
	W	1500	1700	1300	1500	....	....	....	1600	....	1500	....
43x5...	I	85	85	90	85	....	....	....	100	....	100	....
	W	1550	1800	1400	1550	....	....	....	1600	....	1550	....
36x5½..	I	90	....	95	90	....	90	....	110	....	110	....
	W	1400	....	1400	1400	....	1800	....	1500	....	1400	....
37x5½..	I	90	....	95	90	....	90	....	110	....	110	....
	W	1400	....	1500	1400	....	1800	....	1500	....	1400	....
38x5½..	I	90	80	95	90	....	90	....	110	....	110	....
	W	1450	1800	1500	1450	....	1800	....	1550	....	1450	....
40x5½..	I	90	90	95	90	....	....	....	110	....	....	....
	W	1600	2000	1600	1600	..	....	....	1600	....	....	....
37x6...	I	....	....	100	95	....	....	....	120	....	....	....
	W	....	....	1500	1700	....	....	....	1500	....	....	....
39x6...	I	....	....	100	95	....	100	....	120	....	....	....
	W	..	....	1700	1800	....	2250	....	1600	....	....	....
41x6...	I	....	95	100	95	....	100	....	120	....	....	....
	W	....	2200	2000	2000	...	2250	..	1600	....	....	....

I—Inflation pressure. W—Weight (maximum) allowed.



Pennsylvania United States Republic Goodyear Diamond

SOME REPRESENTATIVE NON-SKID TIRES NOW ON THE AMERICAN MARKET

The Goodrich company, Ajax, Republic, Michelin, United States Tire Co., and in fact practically all of the standard manufacturers issue similar instructions and advice to their customers.

Tire costs are regulated largely by size and weight. In the price list issued by the Goodrich company the cost of a 36 x 4 tire is $40.25. Now if the customer wishes to use an oversize tire on the same rim, one measuring 37 x 4 1-2, the cost is $52.15. This is a difference of $11.90 or 29 per cent. If the regular size is 30 x 3, stock tires would cost $15.50 each, but if the purchaser wished for oversizes, he could use tires 31 x 3 1-2, costing $23.70 each, a difference of $8.20 or almost 53 per cent.

While the prices vary to a considerable degree the proportionate increase of a large tire over a small one remains nearly constant.

The 34 x 4 tire is a popular size and comparison with its corresponding oversize tire, rating as 35 x 4 1-2, is probably as good an example as can be cited. The oversize costs 30 per cent. more than the regular. It is likely that this proportion is maintained generally.

The United States Tire Co., comprising the Hartford, Continental, G & J and Morgan & Wright factories, will brand its tires with the name of the parent corporation in the near future, retaining the striking features of each type but changing the trade name of the individual factories for that of the main corporation.

Benefits of Oversize Tires

The justification for the theory of oversize tire advantages rests upon the fact that ordinary stock equipment is intended to take care of ordinary use. But in actual practice the car that is built to carry four persons and 200 pounds of baggage is sometimes called upon to transport as many as seven passengers and 500 pounds of luggage. While the stock tires are built to negotiate the regular load, they are fearfully overburdened by the extraordinary load. Experience proves that the life of overburdened tires is shorter than it is with moderate burden and the equipment of the car with larger tires than those provided in stock will have a tendency to lengthen service by providing a larger bearing surface and larger air cushion.

In order to determine what sizes of tires should be used the United States Tire Co. recommends that the following table of weights in relation to tire sizes be used:

Size.	Rear Weight.	Front Weight.	Size.	Rear Weight.	Front Weight.
28x2½	225 lbs.	275 lbs.	40x4	850 lbs.	1000 lbs.
28x3	350 lbs.	425 lbs.	42x4	900 lbs.	1050 lbs.
30x3	375 lbs.	450 lbs.	32x4½	750 lbs.	950 lbs.
32x3	375 lbs.	450 lbs.	34x4½	900 lbs.	1125 lbs.
28x3½	425 lbs.	500 lbs.	35x4½	935 lbs.	1175 lbs.
30x3½	450 lbs.	550 lbs.	36x4½	975 lbs.	1225 lbs.
31x3½	475 lbs	575 lbs.	37x4½	1010 lbs.	1260 lbs.
32x3½	500 lbs.	600 lbs.	38x4½	1050 lbs.	1300 lbs.
33x3½	525 lbs.	625 lbs.	42x4½	1200 lbs.	1450 lbs.
34x3½	550 lbs.	650 lbs.	34x5	950 lbs.	1200 lbs.
36x3½	600 lbs.	700 lbs.	35x5	1000 lbs.	1250 lbs.
30x4	625 lbs.	750 lbs.	36x5	1050 lbs.	1300 lbs.
31x4	635 lbs.	775 lbs.	37x5	1100 lbs.	1350 lbs.
32x4	650 lbs.	800 lbs.	39x5	1200 lbs.	1450 lbs.
33x4	675 lbs.	850 lbs.	43x5	1400 lbs.	1550 lbs.
34x4	700 lbs.	875 lbs.	37x5½	1150 lbs.	1400 lbs.
35x4	735 lbs.	885 lbs.	38x5½	1200 lbs.	1450 lbs.
36x4	750 lbs.	900 lbs.			

Practically all the other makers approximate the recommendations specified. The pertinent fact about overloading is that it breaks down the side walls of the casing, eventually causing blowouts and damage that cannot be repaired.

In the matter of inflation the makers of pneumatic tires are a unit in demanding that proper air pressure be maintained. Running on insufficient air pressure causes excessive heat from the friction between tube and casing; loosens the plies of fabric in the side walls of the casing and eventually provides for a blowout. A properly inflated tire minimizes the circular rush of air through the inner tube as the car proceeds and by that much reduces heat and friction. It lessens the chances of stone bruises and does away with the danger of rim-cutting. As excessive inflation will cause the car to ride hard, it will be found advantageous as well as economical to follow the figures recommended by all the companies as far as inflation is concerned.

The difference in pounds pressure on the various sizes follows

the change in width of the tires. The mere diameter of a tire has nothing to do with the proper rate of inflation. But when there is a change of 1-2 inch in the distance from the rim to the tread, there must be a material change in the amount of air pressure inside the tube. The least pressure recommended by the majority of the makers is 55 pounds to the square inch and the highest, 90 pounds. The first is for a 2 1-2-inch tire and the high figure is the proper pressure for a 5 1-2-inch tire.

Many manufacturers believe that tires should be inflated to a higher degree than the figures quoted indicate. They recommend a pressure of 20 pounds to the inch of tire width. Thus a 3-inch tire would require 60 pounds of air pressure to the inch of surface and a 6-inch tire would need 120 pounds of air. The United States Tire Co. recommends the following pressures, which are concurred in by numerous makers: 2 1-2-inch tires, 50 pounds; 3-inch tires, 60 pounds; 3 1-2-inch tires, 70 pounds; 4-inch tires, 80 pounds; 4 1-2-inch tires, 90 pounds; 5-inch tires, 100 pounds; 5 1-2-inch tires, 110 pounds.

Non-Skid Development a Feature

The development of non-skid tires has been the most striking feature of 1911 in the tire field. The Bailey tread is the oldest and most widely used type of this description and is manufactured by many companies in the United States under royalty to the inventor. The United States Tire Co., Diamond, Goodrich and many others manufacture this line of tires. The Bailey tread is equipped with round buttons of rubber covering the entire bearing surface of the tire. The buttons are 1-2 inch high and about 3-4 inch in diameter.

The Republic company manufactures the staggard tread tire, which has six rows of rubber studs, each of which is about 2 1-2 inches long and extending around the tire, the studs of one row being placed opposite the intervals between the studs in the adjacent row. This tire is made under the Mell patent.

The Morgan & Wright knobby tread tire has three rows of knobs molded upon the surface of the tread in zig-zag style. The patent under which this tire is made is owned by the company.

The Diamond company heretofore manufactured the Bailey tread as its contribution to non-skids, but this season it is presenting a tire that has some new features. The tread is equipped with studs running circumferentially, but instead of being staggard like the Republic the rows of studs are run in series, so that the surface presents groups of studs.

The Firestone Non-Skid is built with the words Non-Skid molded into the tread diagonally over its whole surface. The resulting angles and curves constitute the non-skid element.

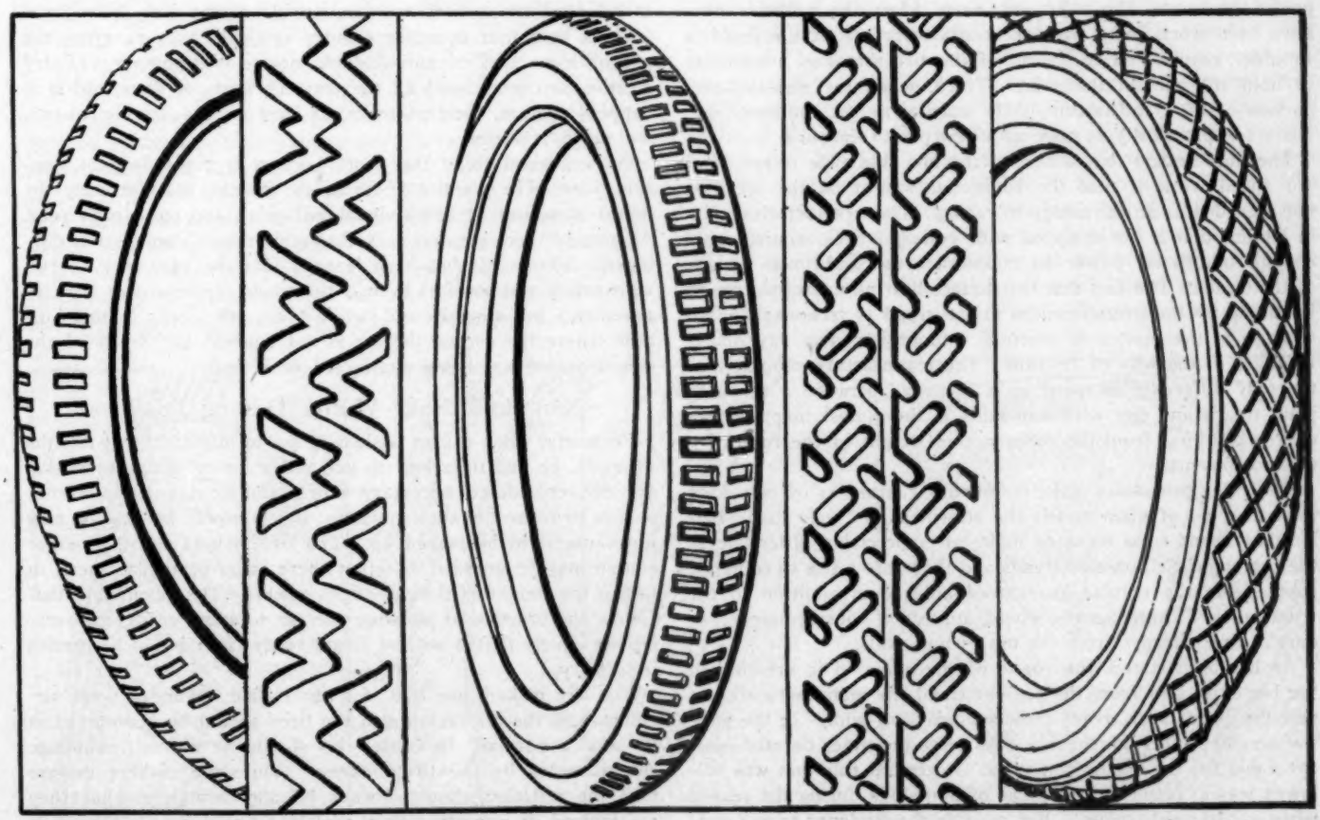
The Pennsylvania company manufactures a tread known as the vacuum-cup tire. The tread is covered with small round studs something like the Bailey tread except that the type of rubber used is different from the rest of the tire, while in the ordinary Bailey tread the studs and the other rubber material are of the same character. In the top of each of the studs a small cup is molded, giving the tire its characteristic action and appearance.

The Goodyear and Ajax companies put out non-skids with diamond-shaped apertures in the surface of the treads and there are various other small variations used by other companies.

Steel studded treads are made by the Michelin company and a number of American factories.

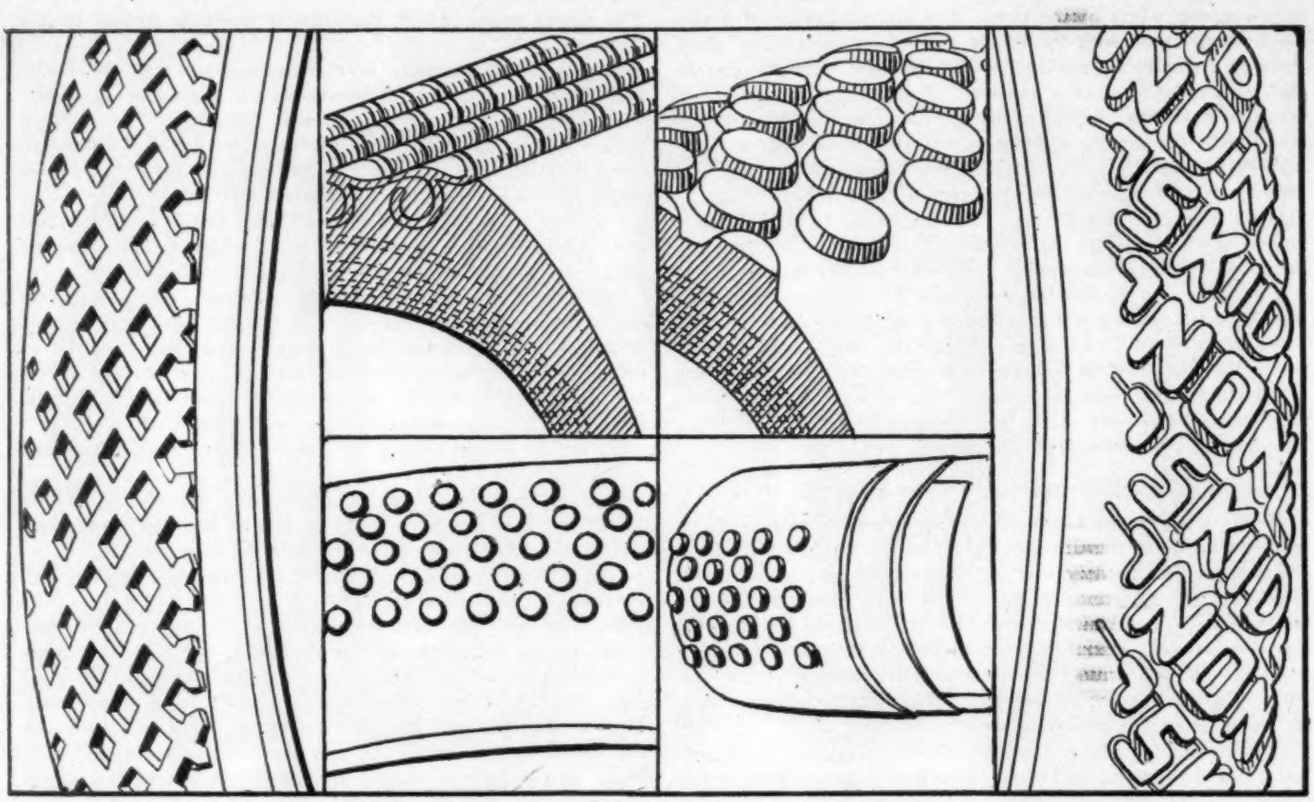
About 40 per cent. of the total output of American tire factories may be designated as non-skid tires. In cost they range from 18 to 20 per cent. higher than ordinary tires of the same size. Some of the factories make a majority of non-skids and one or two run as high as three-fifths of their product in this line. But several of the characteristic companies are only taking up this branch of manufacture and in future the indications point to a larger proportion of non-skids all around.

Except in scattered cases, there is no additional guarantee of mileage, as far as the use of non-skidding tires is concerned. The same inflation pressures and wheel loads are recommended broadly as for the same sizes of plain-tread tires.



Security Miller Stein Shawmut Ajax

SHOWING TREADS OF OTHER TYPES OF AMERICAN NON-SKID TIRES



Swinehart | Midgley—Michelin | Bailey—Goodrich | Firestone

METAL-STUDDED NON-SKID TREADS HAVE THEIR ADVOCATES

The advantages claimed for all types of non-skid tires are as follows: First, they prevent slipping. Some of the companies guarantee this. Second, even when the protuberances have been worn away from the contact surface of the tread, a shoulder remains on each side of the tire that has a tendency to hold the car on the road. Third, when the non-skidding portion of the tread is completely worn away the consumer still has a tire practically as good as a new plain-tread tire.

The only reason that a tire of the non-skid type is not ideal for speed work is that the additional weight of the tread is not regarded as an advantage in racing. The tire factories unite in stating that a car equipped with non-skid tires requires only enough additional power to counteract the additional weight of the treads. The fact that the surface bearing upon the ground is cut up by the protuberances in the tread is reckoned an advantage in the matter of traction without imposing any disadvantages in the way of friction. The manufacturers insist that the only difference in speed on a dry road between a car with plain treads and one with non-skids is the almost inappreciable degree resulting from the difference in weight of the respective tire equipments.

While the companies make no further guarantees of non-skids than they do of plain treads the statement is freely made that it takes about 1,500 miles to make an appreciable difference in the characteristic non-skid treads and therefore a tire so equipped should give the regular guaranteed mileage in addition to the 1,500 miles. These figures would indicate a considerable economy in tire mileages from the use of non-skids.

As has been stated, the vogue of the non-skid is growing in the big cities and from the present trend the manufacturers expect the use of such treads to become country-wide. In the past, wet weather and cold, slippery days were the times deemed most favorable for the use of non-skids. A general rule that was followed was to recommend the use of non-skids during the season when a man needs rubbers. But recently the tendency to use non-skids all the year around has become apparent and is growing rapidly.

The users seem to reason that if the non-skids are good in wet weather they ought to be good in any weather. At any rate New York owners are demonstrating that such is the case.

On a long tour covering country roads of varying types the use of some sort of anti-skidding device is necessary. If dry weather is encountered all the way, no harm is done and if it happens to rain, their presence, at least on the driving wheels, will be appreciated.

As a general thing the winter season is the season of non-skid tires. The practice of laying up the car, that formerly obtained in winter, is being abandoned more and more each year. At present there are few cars absolutely out of commission during the winter. It has been learned that the cars may be run with safety and comfort even if the roads are frozen or the city pavements are slippery and, while there are weeks in this latitude where the use of the car is not general, the limits of the closed season are being contracted each year.

Non-Skids Make Winter Driving Possible

Formerly, when a man wished to lay up his car for 3 months or more, he had it jacked up and did a lot of things to it that are not considered necessary now. But to-day if an owner wishes to retire his automobile for a few weeks he may or may not cause it to be jacked up. The tire makers say that either course may be pursued, but that there is no particular merit in taking the weight of the car off its wheels. The advantages that follow the practice of allowing the car to stand ready for service are chiefly that it will be found ready if it should be needed in a hurry.

The tire makers say that if a car is laid up under these circumstances the air pressure in the tires should be maintained at its service normal. In winter this should be the full poundage recommended by the tire makers. While the makers declare that the inflation should always be approximately what they recommend, it is quite certain that if a tire normally taking 80 pounds of air is given that stress in winter, it ought to be about 5 pounds less in summer. The reason for this is that if a tire

is built for 80 pounds and is pumped up in a cool garage on a summer morning to that figure, the chances are that during operation in the heat of the day the pressure will increase by the expansion of air in the tires until it will affect the riding qualities of the car.

Thus a small allowance may be made for expansion without injuring the tire. On the other hand, the full recommended pressure of inflation will never be a serious disadvantage aside from a certain degree of lost resilience.

If the car is to be jacked up, the air pressure in the tires may be reduced to about 25 pounds to the square inch, or sufficient to hold the tubes and casing in shape. Where the car is to be laid up for any considerable time and it has been decided to jack it up, it will do no harm to let out the air until the indicated pressure is 25 pounds. The garage should be neither hot nor cold. The tire men say that a temperature between 50 and 60 degrees is about right and they warn against freezing and undue warmth. The car should be so placed that the tires can be covered from strong light. If they are raised from the floor there will be little danger of coming in contact with lubricating oil or grease, the destructive effect of which on tires is well known.

As far as extra casings and tubes are concerned, the best practice is to keep them in their original wrappings if possible, in a place where they will be protected from extremes of temperature, dampness and light. If they have been removed from their original wrappings it will be well to hang the casings in a closet and to place the tubes in a cloth sack which may be hung against the casings.

The Problem of Tire Repair

The problem of repairing tires is one of great breadth. In a word, the economy of making repairs depends entirely upon the condition of the tire itself. Retreading is an important process and undoubtedly should be done if the tire is in sufficiently good condition to warrant it. Guarantees generally do not cover retreaded tires, but if the groundwork still remains in the shoe itself, the process may add as much as 2,500 miles to the life of the tire. Under such circumstances it certainly would prove economical. But if the fabric of the tire has been separated to any material extent so that the layers do not cohere throughout; or if the sidewalls have worked loose through being run under insufficient inflation; or if sand blisters and water blisters have served to break down the fabric; or if the shoe has been blown out to such an extent that the fabric cannot be repaired, retreading will but prove an aggravation of the spirit.

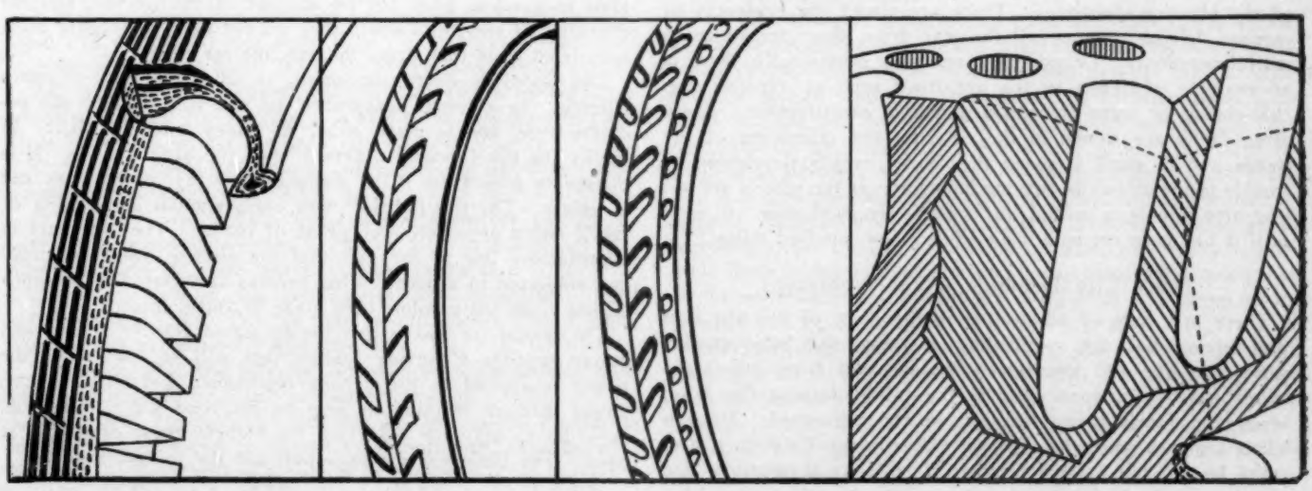
It requires about 10 days to do the job properly. Of course the actual work does not take that long, but most of the companies will agree to return the work in that space of time. The cost varies with the size of the tire and its condition. As a general thing if the fabric is sound and if the tire has been run under full inflation and without overload, it will pay to have it retreaded; otherwise not.

Frequently a tire that seems to be in fair condition and worth retreading only gives a few hundred miles after being repaired, while in exceptional cases the mileage will run up to 3,000 or even more. The average is said to be about 1,500 miles. The reason for small mileage after retreading may be some hidden defect in the tire, or it may be that its previous use has taken its life. But generally the driver who can use a tire until the treads are worn away has exercised care and due caution in his driving and has always seen to it that the inflation has been proper and the load reasonable.

There are many times in motoring where tires should have the advantage of first aid. Where deep cuts have been sustained as a result of running over rock or broken glass, prompt attention means dollars. If the driver will wash out the wound with gasoline to remove dirt and foreign substances and then apply one of the patent pastes or cements, the chances are that he will gain a large amount of mileage that would be lost if such cuts are neglected. This is a job that should be done by the driver, either on the spot or immediately after returning from the ride. The cost of such repairs is trifling and the potential saving is great.

Inner liners, blowout patches and other emergency repair materials have an important mission. Most of the tire companies will not guarantee any mileage whatever if inner liners are used, but nevertheless there is a real reason for using them sometimes.

The simplest form of such things is the blowout patch. This is a strip of canvas fabric, impregnated with rubber, which may be applied to the inside surface of the casing to cover a wound made by a blowout, or to strengthen a weak place in the shoe. There are also a number of tire patches of various kinds, but mostly used for small punctures. When the shoe has been repaired with a blow-out patch, the usual practice is to lace a composition patch around the outside of the tire, over the place where the blow-out patch has been affixed. Such a repair will often allow the car to be driven to its garage and frequently has held safely for 100 miles. Inner liners are simply strips of material designed to go inside the shoe and between it and the inner tube. The idea behind such things is to protect the inner tube from injury through puncture of the tread. The tire men object to inner liners because they hold that the tubes are supposed to fill all the space within the shoe and that the insertion of the liner has a tendency to prevent full inflation. This, however, is combated by the makers of inner liners, who claim that their wares add to the life of a tire. The materials from which



Durable Dayton Firestone Motz Swinehart

REPRESENTATIVE AMERICAN SOLID AND CUSHION TIRES FOR ELECTRICS

TABLE OF STANDARD TIRE OVERSIZES

The following tabulation shows what may be termed the standard oversizes made by American tire manufacturers. Except for the first and third items, which show an increase of only 1-4 inch in thickness ove the regular stock sizes, the other tires a e 1 full inch wider from tread to tread and 1-2 inch wider from tread to rim than the regular sizes corresponding with them. The two sizes mentioned are for tires of the Fisk type, bolted on the felloes.

Standard Tire Sizes		Oversizes Made to Fit Same Rims	Standard Tire Sizes		Oversizes Made to Fit Same Rims
28x3	fits	28x3¼	34x4	fits	35x4½
28x3	fits	29x3½	36x4	fits	37x4½
30x3	fits	30x3¼	34x4½	fits	35x5
30x3	fits	31x3½	36x4½	fits	37x5
32x3	fits	33x3½	38x4½	fits	39x5
34x3	fits	35x3½	40x4½	fits	41x5
36x3	fits	37x3½	42x4½	fits	43x5
30x3½	fits	31x4	36x5	fits	37x5½
32x3½	fits	33x4	36x5½	fits	37x6
34x3½	fits	35x4	38x5½	fits	39x6
36x3½	fits	37x4	40x5½	fits	41x6
32x4	fits	33x4½			

inner liners are made are cotton, rubber, leather and composition. In selected instances, users have made as much as 5,000 miles by employing inner liners in shoes from which the treads have been considerably worn.

The whole tire situation may be summed up as follows: In selecting tires, the weight they are to carry should be considered. If there is any likelihood that 1,000 pounds extra load may be carried, the largest oversize tire that will fit the stock rim should be selected. This will cost approximately 30 per cent. more than the regular size. Due care should be used to maintain the recommended degree of inflation, which is practically 20 pounds to the square inch for each inch of the tire's thickness. Thus if the tire is 4 1-2 inches thick, the inflation should be 90 pounds, approximately. Non-skids are growing in popularity, particularly for the driving wheels. Such tires cost, roughly, 20 per cent. more than plain treads. Thus, if an owner wishes to equip his car with oversize non-skids he will have to pay about half as much again for his tires as he would if he used the ordinary stock tires indicated by the size of his rims.

While his guaranteed mileage would not be increased by going to that expense, the actual miles his car would deliver without tire replacements would undoubtedly be increased materially. Estimates on this point run as high as 200 per cent. of the guaranteed figures. If that is so, the use of oversize non-skid tires would cut down the tire cost per mile in a way that will run into real money in the course of a season or two.

A most sorrowful condition is revealed in the morgue of any of the big tire companies. There are stored the evidences of careless driving, ranging all the way from sheer ignorance to willful perversity. Occasionally, and only occasionally, there is an example of defect in the tire itself such as under-curing, over-curing or some structural defect in manufacture. These three faults are shown in the coloring and crumbling of the treads and in small loops in the fabric, usually developing in trouble in the sidewalls, causing blowouts. If the wheels are not true, tire trouble is invited, for a perfectly good shoe will look as if it had been cut with a file after a few hundred miles.

Tire's Life Depends Upon Treatment

There is a note of admiration in the voice of the tire man who receives tires for overhauling or storage that have traveled more than the full guaranteed mileage and from which the treads have been worn clear to the fabric, leaving the sides, beads and fabric sound, serviceable and unharmed. He can tell at a glance when the tires have been misused. With a steel probe he can tell quickly whether it will pay to repair a tire and, conversely, he knows almost instantly when the scrap heap is near.

The life of a tire depends largely upon its treatment. Driven under-inflated at high speed and subjected to a little reckless work in turning corners and aggravated by the unwise use of brakes, there is no reason why the best tire made should stand up more than a day. On the other hand, a little judgment on the part of the user in keeping up the pressure in the tires; care in turning corners and reasonableness in the application of brakes and there is no reason why the guaranteed mileage of any standard tire should not be the minimum amount delivered.

It may be noted in this connection that all standard makes of tires are built to exceed their guaranteed mileages. If there was any structural reason for their not doing so, the companies could not afford to guarantee them. Thus with due care, which includes selection of proper sizes and treads and proper inflation at all times; cleansing of cuts and avoidance of sand blisters, the guaranteed figures should be minimum and not maximum service.

Pneumatic Tires for Electric Cars

The section of the tire industry represented by the manufacture of pneumatics for electric automobiles is of considerable size and is growing in scope and importance. The electric car requires tires with more resilience than does its gasoline brother. Its motor requires more traction at the point of road contact and in many ways the ideal tire for the electric differs from ordinary tires.

There are two companies that make a specialty of the making of pneumatics for electric cars. These are the B. F. Goodrich Company and the Goodyear Tire & Rubber Company. The Goodrich tire is called the Palmer Web and has been on the market for three years. The construction of the tire is along the lines of the original Palmer Web type and includes the use of eight plies of fabric in connection with a light, high-grade class of rubber composition. The company recommends practically the same rates of inflation for the various sizes that are made with reference to the gasoline pneumatics.

In round figures these are for 20 pounds air pressure to the inch for each inch of tube thickness. Thus in a tire 28 x 2 1-2 inches the pressure required for the average wheel load would be 50 pounds to the square inch. While this rate is recommended for all tires up to and including 4 inches, after that the pressure does not increase in the same ratio. For instance, in a tire 4 1-2 inches wide the inflation pressure would be 85 pounds and in one of 5 inches the inflation ought to be 90 pounds.

The sizes of tires made in Palmer Web style are as follows:

28 x 2½	32 x 3½	32 x 4	32 x 4½
28 x 3	34 x 3½	33 x 4	34 x 4½
30 x 3	36 x 3½	34 x 4	36 x 4½
32 x 3	30 x 4	35 x 4	40 x 4½
30 x 3½	31 x 4	36 x 4	36 x 5

In price they are somewhat higher than the corresponding sizes in gasoline tires, but on account of construction and the character of service to which they are put users get higher mileages from them than from the gasoline car tires.

The Goodyear electric pneumatic is called the Long Distance Electric. In external appearance the tire is similar to the ordinary type, and is made either in Bailey tread or plain. In reality the tire is vastly different from the ordinary tire. It is thicker in proportion to its diameter in many of the sizes and is lighter. The tire is made with extra amount and quality of fabric and a peculiarly high grade of rubber. The difference in manufacture lies in the fact that the electric tire is moulded and subjected to a quick curing process as opposed to the open curing given the gasoline tires made by this company.

The reason for this is that the saving of electric current and power requires a bearing surface that will not slip when the power is applied to the driving mechanism and will not lose power through relaxing its grip on the road while in motion. In order to get such a surface the highest grade of rubber is used. The Goodyear company puts out the following sizes:

30 x 3	32 x 3½	30 x 4	33 x 4
32 x 3	34 x 3½	31 x 4	34 x 4
30 x 3½	36 x 3½	32 x 4	32 x 4½

Inflation pressures recommended correspond closely to those advocated for similar sizes of gasoline pneumatics.

In addition to these two varieties of electric pneumatics the Diamond Rubber Company finds that there is a constant demand for its Silvertown Cord tires for use in electric automobile equipment. Probably over 90 per cent. of this element of the Diamond company's production goes into use on gasoline cars, but the Silvertown Cord tires meets the conditions of electric automobile operation very satisfactorily.

The line includes the whole category of tire sizes.

The United States Tire Company is also entering this field with much success, pushing one of the Morgan & Wright tires.

Large Field for Solid and Cushion Tires

In the solids, semi-solids and cushion tires for use on electrics the field is broad and its limits are uncertain. The best-known makes of electric cars use various styles of tires. The Motz tire is one of the most popular brands. This tire is built to fit all standard rims used on electric cars. It is a trifle less in width than is a pneumatic of similar diameter. It is constructed without emphasis on the matter of fabric. There is no tube to contain compressed air, the inequalities in road surface being taken up by a series of molded cuts in the sides of the tire, which may be described as inverted studs. The tread is elastic and of high quality rubber to withstand wear and provide for constant and uniform traction in action under all conditions.

The Motz tire is furnished as stock equipment with certain makes of electric cars.

The Dayton Airless is not an electric tire in a contracted sense. It is used largely upon gasoline automobiles. The Dayton is made with a carcass and tread like the ordinary automobile casing, but the space usually occupied by the inner tube is taken up with a series of solid rubber piers, separated by air chambers. These piers support the tread and fill out the side walls. There are many other styles and makes of semi-solid and cushion tires on the market, but their individual volume of production is not great.

Among the new features in the field of tires is the type presented by the O. & W. Company. This tire is called the Overman and is radically different from any tire on the market. It is a cushion tire built almost entirely without fabric. The tread is 4 1-2 inches across and slopes up to the rim, where it is about 6 inches. It is solid rubber, except for a diamond-shaped air chamber in the center, bound with one ply of friction cloth. The tire is securely fastened to the rim. Running around the circumference in the middle of the tread is a V-shaped space, and on either side the tread is scored with deep cuts which are staggard against corresponding blank spaces. This tire has been used on gasoline and electric cars of both commercial and pleasure types.

Harking Back a Decade

FROM *The Motor Review* of January 9, 1902:

The Electric Vehicle Company of Hartford has filed a mortgage and trust deed to the Morton Trust Company, of New York, for $2,250,000. All the property of the company's plant is covered. The purpose of the mortgage is to refund $1,675,000 of gold coupon bonds and to provide for other financing.

Charles R. Flint & Company applied for a receivership for the Crude Rubber Company both in Virginia and New York last week. William W. Ladd has been named as receiver. The company has liabilities of about $5,500,000 and assets nearly the same, consisting largely of crude rubber pledged to various banks as collateral for loans. The falling rubber market is said to be the real cause of the failure. Most of the rubber on hand was purchased up to $1.30 a pound. The present market level is materially lower.

The Toledo steam carriage now on its way from Toledo to Hot Springs, Ark., has arrived at Cincinnati.

The *Cycle Age* has suspended publication and the company will be wound up. The company has published *The Cycle Age* since 1897 and *Motor Age* since 1899. S. A. Miles will continue to publish the latter under the name of the *New Motor Age*.

Ed. S. Kelley, of Springfield, Ohio, president of the Consolidated Rubber Tire Company, is said to be preparing to retire from leadership in that concern.

The Union Carbide Company, of Cleveland, has been incorporated to manufacture acetylene gas.

P. P. Pierce, of Buffalo, made the first century run of the year in an automobile when he drove a 3 1-2-horsepower motorette to Erie, Pa., and return on New Year's Day.

November exports of automobiles and automobile parts amounted to $30,383. For the nine months ending with November the total exports were $301,920.

The exhibits at the recently closed French automobile show were estimated to be worth at least $1,000,000.

Higal and Truffault, owners of the Impossible Engine or Serpent Motor, which is classed as a motorette, have issued a challenge to the world at a mile or kilometer.

A German engineer advises that a mixture of 20 per cent. of glycerine be added to the cooling water in conjunction with a handful of soda where the car is to be exposed to low temperatures. This will prevent freezing even in cold weather, and is particularly valuable in benzine motors.

Considering how few sports there are which have not suffered severely from the over-development of racing, there are grounds for sincere congratulation in the fact that up to the present time the influence of automobile racing has been of distinct advantage both in creating a popular demand for the automobile and in producing something that is not a racing machine, but is adapted to meet this new demand.—*Editorial.*

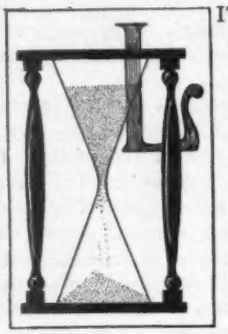
Growth of German Motor-Car Industry

A communication from Consul General Frank Dillingham, of Coburg, says that a recent report published by the Association of German Motor Vehicle Manufacturers says that the year 1910-11 again marks a great advance in the development of the German automobile industry.

The total turnover with foreign countries—that is, the import and export trade in motor cars, automobile bodies, motors, and motor cycles—for the year 1910 increased 45.9 per cent. as compared with 1909, and rose from $9,800,000 to $14,300,000. This large increase was due mainly to the augmentation of the German exports of the articles mentioned, which rose 59.9 per cent, or $4,400,000. As the imports advanced only about $100,000, it is apparent that the increase in inland orders was met by German manufacturers. This increase in home orders can be reckoned by the number of vehicles in use. On January 1, 1911, there were 57,805 motor vehicles in use, being 7,864 more than at the commencement of the preceding year and being an increase of 15.7 per cent.

The foregoing figures tend to show that foreign firms are meeting with strong competition and that German exports are growing at a surprising rate. Data at hand for the period from January 1 to August 1, 1911, value the exports at $5,400,000, as compared with $3,600,000 for the same months last year, being a further increase of 50 per cent. The inland demand is also steadily growing and figures for the present year are expected to show another large increase.

Increasing Efficiency of Repair Shop



LITTLE drops of water, little grains of sand . . . A large number of small items constitute the expense account of a large corporation, and it is absolutely necessary to pay full attention even to the small details in the operation of its works. If this is not done, the things looked upon as unimportant will wreak their revenge upon the unsuspecting enterpriser, and when he settles down to review the situation he will find that his slighting of the details has brought about very serious results.

For the last one or two years service departments have been installed in the large cities by the great automobile manufacturers, and systems have been developed to conduct these departments to the combined advantage of the customer and the maker. The development of the system depended to a large extent upon the nature of the company's business, but also upon the individuality of the men in charge of the service departments and the influence of the men directing them has been acknowledged by the manufacturers.

In the following a brief description is given of the service department system of the United Motor New York Company, the concern handling the business of the United States Motor Company in the Metropolis, and whose address is 3 West Sixty-first street. Names and figures used in this article are fictitious throughout.

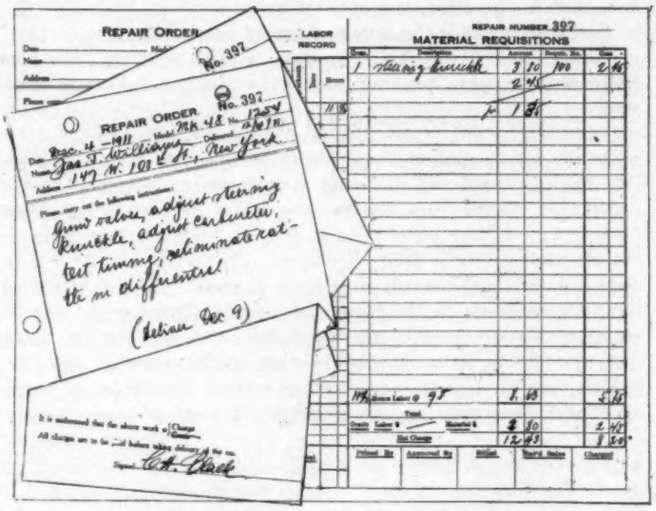


Fig. 1—Repair order on which the necessary operations are entered and their cost and value figured

The cars, Maxwell, Columbia, Brush, etc., which are sent in for overhauling by their makers or owners are either tested for their needs or else these are specified by the owner and noted on the left-hand side of the sheets, Fig. 1. The case illustrated is that of Mr. J. T. Williams' Columbia Mark 48 car, No. 1254. It came in on December 4 with the trouble specified in Fig. 1. Of the left-hand side of this sheet three carbon copies are made, one of which is filed by the superintendent, the second by the foreman of the shop and the last by the shop clerk. The foreman to whom the car was given with the repair order handed the machine over to Workman No. 22, T. R. Taylor, who started on the job at 8 a. m. the following morning and spent his time as specified on time card, Fig. 2. The card was punched at start and stop in the morning and afternoon, making a total working time of nine hours that day. In the course of the operations it developed that the car required a new steering knuckle, whereupon the worker filled out slip, Fig. 3, which he handed over to the stockroom keeper, who gave him the part mentioned.

PURCHASE REQUISITION

Date 191

Quantity On Hand	Quantity Required	Description	Quantity To Order	Order From	Purchase Order No.

Requisitioned By | Approved By | Ordered By

Fig. 4—Requisition for parts which are bought from outside dealers

Sometimes it is necessary to get a part from outside, for instance, in the case of nuts and bolts, which are bought by the company in large quantities. In such a case the sheet, Fig. 4, is used upon which the nature of the part is entered, together with the number of parts on hand and the number required, which is, of course, greater than the first one. The difference is the quantity the stockroom keeper has to order, and he enters the name of the supply house as well as the order of his purchase number on the sheet before filing it away.

The automobile No. 1254 could not be finished on the

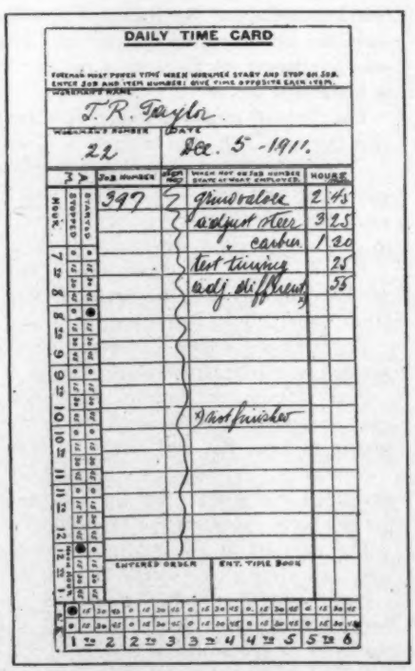


Fig. 2—Workers' time card on which starting, stopping and job times are marked

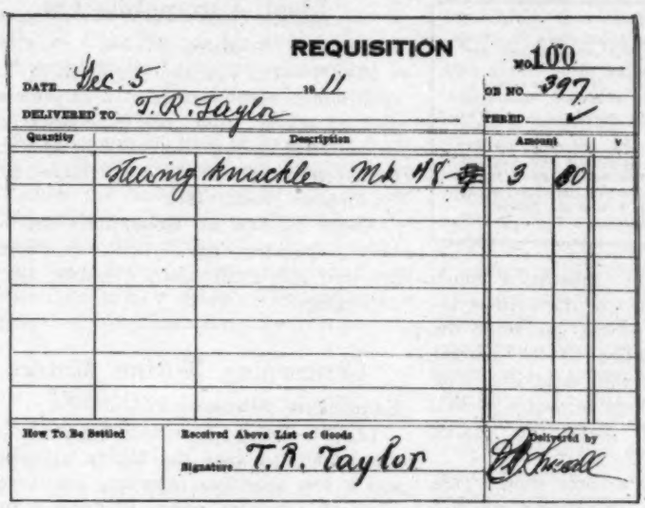
DECEMBER, 1911

SHOP NUMBER OF WORKERS AND TIME ON JOB

Order No.	Name Car Owner	Shop No.	24 Hrs.	9 Hrs.	6 Hrs.	18 Hrs.	3 Hrs.	Total Hrs.
547	J. D. Rough.....	.....	4	2	1	1	2	10
548	Donald Lay.....	.....	3	1	5	.....	1	10
552	E. J. Ship.....	.....	2	4	3	1	1	11
555	H. W. White.....	.....	.....	2	.....	7	5	14
	Total time.....	.....	9	9	9	9	9	45

Fig. 7—Account of time spent by each worker on each job

first day and on the following day another man spent 2 1-2 hours on this job. This made a total of 11 1-2 hours' labor spent on the car, which was listed and billed to customer at, say, 75 cents an hour, while the cost of labor was 50 cents. The steering knuckle put on the machine had a list price of $3.80 and cost the company $2.45. This made a total bill of $12.43, the total cost of the items being $8.20, leaving a gross profit of $4.23.



REQUISITION

No. 100

DATE Dec. 5 19 11 — ON NO. 397

DELIVERED TO T. R. Taylo — TERMS

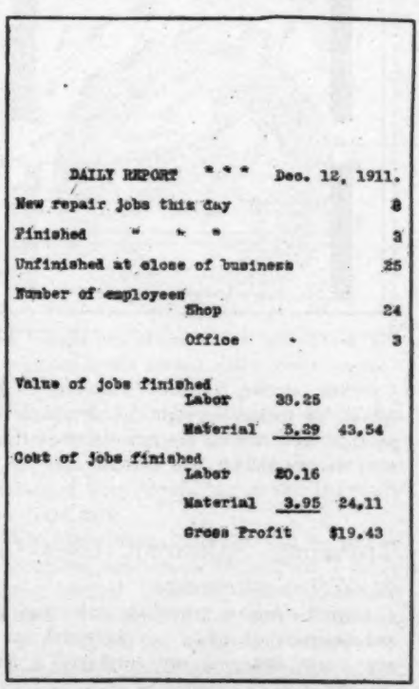
Quantity	Description	Amount		V
	Steering knuckle Mk 48	3	80	

How To Be Settled — Received Above List of Goods — Signature T. R. Taylor — Delivered by

Fig. 3.—Report of the stockroom clerk which is handed to the superintendent every night

From the gross profit is deducted, by the superintendent or bookkeper, the amount of fixed charges falling to its share, and the rest is net profit—or net loss.

Each day the stockroom clerk makes out his daily report, Fig. 5. The report here shown is that of December 12, when three cars were turned out by the shop. The list price and cost of both labor and material used on each job were entered on the sheet, making a total list price of $43,54 and a total cost of $24.11. The difference, or $19.43, was the gross profit of the department for December 12. The sheet, Fig. 5, was handed to the superintendent on the evening of that day, and the next morning he ordered his office daily report to be prepared, which is shown in Fig. 6.



DAILY REPORT * * * Dec. 12, 1911.

New repair jobs this day		8
Finished " " "		3
Unfinished at close of business		25
Number of employees		
Shop		24
Office		3
Value of jobs finished		
Labor	30.25	
Material	3.29	43.54
Cost of jobs finished		
Labor	20.16	
Material	3.95	24.11
Gross Profit		$19.43

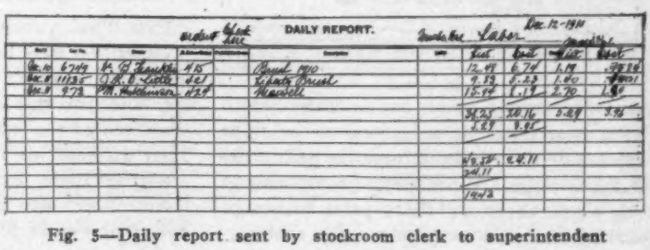
Fig. 6—Daily office report of general conditions of the service department

On this report appear the following items: (1) New repair jobs this day; the number of automobiles received from owners or chauffeurs for repair purposes; (2) finished repair jobs this day, which are the jobs specified in detail in Fig. 5; (3) unfinished jobs at close of business, that is, the number of machines still in the shop at 6 p. m., December 12 (the repair orders, Fig. 1, of these jobs are all kept on a file before the superintendent), and (4) the number of employees, which was 27, 24 being employed in the shop and 3 in the office. The rest of the sheet is filled by a copy of the report, Fig. 5.

This is the whole system which comprises every detail of service department operation for each working day of the year. But it is up to the superintendent to keep track of the development of the business for every month and year, and this work is done by means of two ledgers. One of them contains on its pages such records as the one seen in Fig. 7. On each line appears the name of a customer, together with the number of hours spent on it by each workman who was occupied with the repair of the car. For instance, Mr. Donald Lay's automobile was repaired on December 15. It was worked upon during 5 hours only, but four men were occupied with the job. Man No. 24 worked 3 hours, 9 1 hour, 6 5 hours and 3 1 hour, making a total of 10 hours' work on the car. On the other hand man No. 24 spent 4 hours on the repair of J. D. Rough's machine and 2 hours on that of E. J. Ship, thus making a total working time on time card of 9 hours. The sum of total working times of workers and the sum of total hours spent on each job must check at the end of the working day.

The second ledger contains the names of the customers, and shows how many hours were consumed by repairs on their cars each day of the month. The 30 or 31 days of the month are spaced over two facing pages, the left-hand one also containing a space for the customer's name and the right-hand one for the total number of hours charged to him during the month. In this case, too, the sum of total hours of each day and the sum of total hours on each client's automobile must check.

Reference to Fig. 6 shows that the whole office work is done by three persons, one being the superintendent, the second his assistant and the last a boy. The boy types the records and files



DAILY REPORT. Labor Dec. 12-1911

Fig. 5—Daily report sent by stockroom clerk to superintendent

away the various sheets and cards in their numerical order. An alphabetical card file with the names of customers and their machines gives ready reference to the repair orders and their subsidiary cards and sheets. The billing and accounting is done by the superintendent's assistant, while the superintendent has the superior check on the whole system, and keeps a general control of the parallelism between the shop work and its records.

The remaining part of system work, that is the accounting of the income of the department against its expenses of all kinds, including wages of the employees, rent, light, heat and power, and small items, is taken care of by the assistant of the superintendent who checks all figures before they are passed on to the central office of the company.

DECEMBER, 1910

Customer	1	2	3	4	5	6	7	8	...	(to	31)	Total Hrs.
James McCall		5	2									7
Frank Redding		4	1									5
S. G. Van Nyhuis			5	3	2							10
Geo. M. Bell			4	1½								5½
A. Spenco			7	8	3							18
Dr. M. Bly			4	9	9	9	3					34
M. C. Crapp			2	9	3½							14½

Fig. 8—Sample page from the owners' monthly account book

Letters Answered and Discussed

The Editor invites subscribers to communicate their automobile troubles and personal experiences, stating them clearly on one side of the paper. If the nature of the case permits, send a sketch, even if it be rough, in order to assist to a clearer understanding. Each communication will receive attention in the order of its receipt, if the writer's signature and address accompany it as an evidence of good faith. If the writer objects to the publication of his name, he may add a nom de plume.

Regarding Two-Cycle Motor

EDITOR THE AUTOMOBILE:

[2,985]—The sketch (Fig. 1) shows 4 by 6-inch, two-cycle engine; the height of exhaust is 1 inch or 52 degrees 30 minutes on crank circle; intake of pure air from crankcase 36 degrees or 15-32 inch high and when air is injected

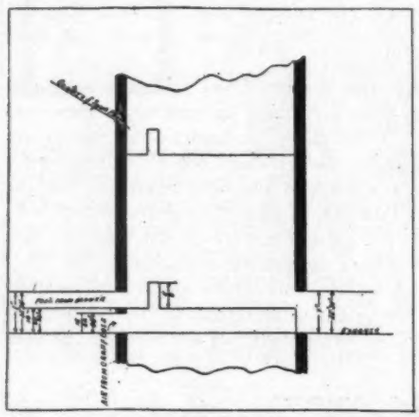


Fig. 1—Section through cylinder of proposed two-cycle motor

by blower piston is at 40 degrees or 19-32 minute or 12 degrees 30 minutes before exhaust is closed. When engine is running at 200 r.p.m. there will be 5 cubic inches of air injected and proportions are to be 15 to 1 by weight.

(1) Do you think any of this charge of 5 cubic inches will pass by the deflector and out the exhaust?

(2) Do you think this small amount of charge would fail to ignite if spark plug was placed as shown in illustration?

(3) When running at 800 r.p.m. there will be 15 cubic inches of charge forced into cylinder. Do you think that any of this would go out of exhaust?

If you think some of charge would be lost then would you recommend opening fuel inlet at 45 degrees instead of 40 degrees or 7 degrees 30 minutes before exhaust closes?

W. M. BAUMHECKEL.

Cincinnati, O.

The amount of charge which passes through the exhaust port will be too small to seriously affect the operation of the motor. We would recommend, however, that a baffle plate be used which would not offer so much resistance to the incoming charge, and that the pocket at the bottom of the baffle plate be done away with. In a piston shaped as in Fig. 2, this would be accomplished and an easier passage for the exhaust would be furnished. In a two-cycle motor the path of the incoming gases and the exhaust is much as is shown in the sketch, the arrows indicating the passage of the gas while the dots indicate the position of the general pocket which is filled with dead gas. The spark plug should be kept from this pocket.

(2) With a good spark the charge should be ignited.

(3) No appreciable amount should pass through the exhaust. The timing you use should be about right.

Automobilist's Tale of Woe

Editor THE AUTOMOBILE:

[2,986]—I have desired for a long time to install an electric lighting system on my car, and for this reason have written to about ten of the leading makers in the field. They all sent me their catalogs, but after studying these carefully for about one month I did not know much more about the subject than I did before taking it up.

After this period of disgust I went forth to the nearest factory and after looking over the place and the goods I bought their system and have since felt keen satisfaction in regard to this purchase. Nevertheless, it is only due to chance that I bought this good system. When I went to the factory of the maker, ten minutes' conversation taught me more about electric lighting than a month's reading.

If this is so, I am sure it is not my fault, but that of the literature I studied. Not one of the catalogs made it plain what the dynamo did in daytime when no lights are required, nor to what extent the tungsten filament could stand the fluctuations in voltage brought about by a variation of driving speed. Very few, indeed, specified on the candlepower of head, side, tail and speedometer lights; but there are a number of glittering generalities in almost every catalog, and as they are of no use either to maker or customer I conclude that something is at fault with the men from whom this literature emanates. I feel sure not only that they are not the same that make the goods, but also that they do not know much about them.

FRED O'K.

Mattoon, Ill.

Ideal Automobile Oil

Editor THE AUTOMOBILE:

[2,987]—Will you kindly publish in THE AUTOMOBILE specifications of a gasoline-engine oil which, from your experience, will be an ideal oil; giving gravity, fire test, flash test and viscosity? REPAIRER.

Chippewa Falls, Wis.

About the best oil would have the following specifications: Gravity, 26 Baumé; fire test, 450; flash, 1200; viscosity, 250 at 70 degrees.

Concerning Marine Motors

Editor THE AUTOMOBILE:

[2,988]—Being a subscriber to THE AUTOMOBILE, I take the liberty of asking you a few questions regarding the dimensions of a marine motor of from 5 to 6 horsepower of the four-cylinder type. What would be the bore, stroke, diameter and weight of flywheel, revolutions per minute, thickness of crankshaft?

Woodbine, N. J. M. SUBBER.

Taking the figures furnished by a well-known maker of this type of motor, which has a very conservative rating at 6 horsepower, the figures are as follows: Bore,

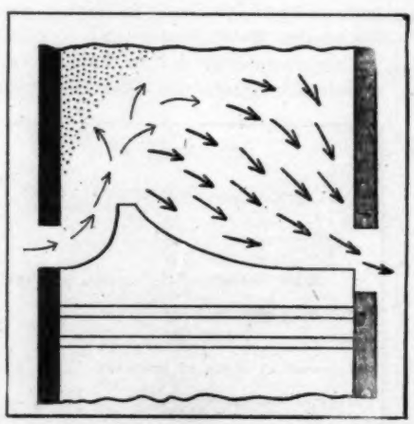


Fig. 2—Showing flow of intake and exhaust gases

5 inches; stroke, 6 inches; diameter of flywheel, 18 inches; weight of flywheel, 125 pounds; revolutions per minute, 500; thickness of crankshaft, 1¾ inches.

Traveling Salesman Uses Car

Editor THE AUTOMOBILE:

[2,989]—Am a traveling salesman and am desirous of using my personal car in my work, charging my employer a fixed amount for each mile.

The car is a new $1,000 machine, weighs

2,300 pounds when loaded, has 33 by 4-inch tires, is 22 horsepower, with 3 3-4-inch bore by 4 1-2-inch stroke. I pay 14 cents for gasoline, 50 cents for oil and wish to include depreciation. Could you give me a rough estimate to charge, using the above figures to work upon?

I do not care to charge interest, insurance, license, registration, storage or repairs, as I use the car for pleasure also.

A reply would be greatly appreciated by a WALTHAM SUBSCRIBER.

Waltham, Mass.

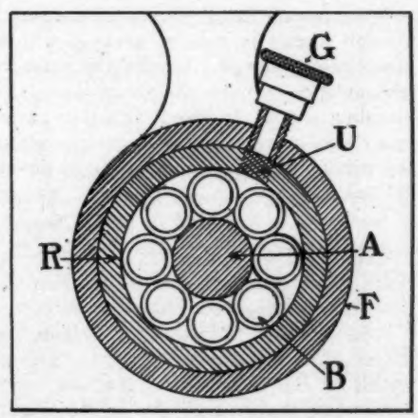
By keeping your tires at 80 pounds front and 75 pounds rear and not running over 20 miles per hour a cost of 6 cents per mile would be about fair. This amount is reached by figuring gasoline and oil at 1 cent, depreciation 1 cent, maintainance 2 cents, and tires 2 cents. This includes a general overhauling every two years.

Defective Lubrication

Editor THE AUTOMOBILE:

[2,990]—I am the owner of a 1909 roadster. The car has been run about 1,200 miles, and came to a standstill on account of the roller bearings and their retaining case massing together and grinding the axle proper and its housing to a considerable extent, until the mass almost prevented the wheel from turning. The whole trouble was due to the defective drilling of grease passage as explained in accompanying sketch. (Fig. 3.)

I wrote to the makers, explaining the case and requested them to send me new



Imperfect grease passage which caused trouble

parts to replace the damaged ones, but they replied that as it did not happen within the six months for which the car was guaranted they would not make the damage good now.

Now the reason I am writing to you is to get your opinion as to whether I could legally compel them to make good this damage. I can prove the facts of the case by any number of competent machinists, as the car has not been touched yet. The defect existed at the time the car was sold, but on account of the grease with which the car axles were packed no damage would result until same was used up. I always noticed in filling this grease cup that on screwing same down considerable squeezed out, but as the first part of the grease passage was drilled I attributed it to worn threads of the cup.

Was I to blame for not discovering something that a half dozen repairmen who had made various repairs on the car and given it a general overhauling overlooked, or was the company to blame for selling a car which on account of defective construction would sooner or later result in damage as it has with me? Had I not discovered the trouble when I did (rear axle began to squeak) I might have been killed, as I was just preparing to go over a canyon way which was five miles uphill and six downhill, being in most places only wide enough for one vehicle, with steep mountain side running up on the right and a stream twenty feet below on the left. The axle surely would have been cut off in another mile's run downhill.

I believe that a company that passes off defective cars on the public and will not make good ought to be exposed.

If they would not replace all of the damaged parts they ought to at least come half-way, for if the axle had been properly drilled the damage never would have resulted. READER.

Garden City, Wash.

This is a very peculiar and rare accident. It is very well explained by the sketch. The grease-cup G was fitted in the correct position, but was undrilled at the point U. F is the flange surrounding the rear axle for the support of the brakes, R is the rear axle housing, A the rear axle, B the roller bearings.

Composition of Tire Dope

Editor THE AUTOMOBILE:

[2,991]—(1) Would you kindly tell me the constituents of some preparation for the purpose of filling the cuts in casings?

(2) Of what benefit is the use of picric acid or sal ammoniac and how should it be used?

(3) Is the use of heavy oil of any benefit as an aid to good compression? I have a machine with new rings and the piston supplied by the manufacturers, but still have no compression. The valves seat well and there are no marks of cutting on the cylinder walls. W. J. M.

Racine, Wis.

(1) Rubber solution is made by dissolving pure Para rubber in spirit, naphtha, carbon bisulphide or benzine. It is inflammable and should be kept away from any flame. It will also deteriorate rapidly if the bottle is not kept tightly sealed.

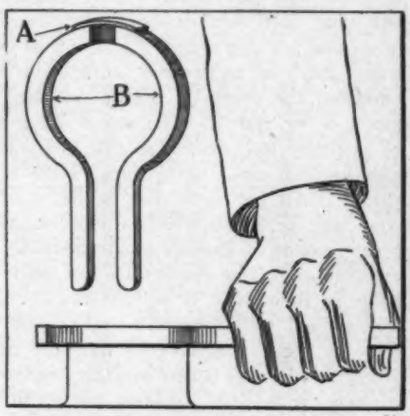
(2) Picric acid, $C_6H_2(NO_2)_3OH$, has been used in connection with gasoline to increase the power of the engine by releasing oxygen in the combustion chamber. It has a very detrimental effect on the motor, hence its use is not advised.

(3) Heavy oil, if used in sufficient quantities to give the piston a sucking fit, would give rise to carbon troubles. The compression of the motor should be entirely independent of cylinder lubrication.

Neat Home-Made Device

Editor THE AUTOMOBILE:

[2,992]—In answer to "Trouble" in THE AUTOMOBILE of December 29, 1911, referring to removing radiator caps which stick, would say that the accompanying rough sketch (Fig. 4) shows a little tool which I made for the purpose of unscrew-



Handy tool for removing tight radiator cap

ing a radiator cap which sticks. This little tool is made of wood, with a piece of flat steel A, to join the two parts together, which also acts as a spring to hold open the jaws B. It is very simple and you can get a grip on the cap equal to a Stillson wrench without injuring it.

E. E. JAMESON.

Derby, Conn.

Objects to Salt

Editor THE AUTOMOBILE:

[2,993]—I presume you read and approved the assertion in THE AUTOMOBILE of December 21 that common salt is the best anti-freezing chemical to use in the cooling apparatus of an automobile.

In spite of this, my mind is still in doubt because the article was unsigned. I never saw the assertion in THE AUTOMOBILE before and some people warn against salt.

I and some of my friends would appreciate some definite word from you on this question. W. W. ROSE.

Newark, N. J.

The use of salt of the common or garden variety is by no means recommended for use in the cooling system. Chemically pure NaCl is a powerful non-freezing agent and its use would not be attended by the dangers that are coincident with the use of common salt. However, the solution advised by many authorities consists of denatured alcohol, glycerine and water, with a small quantity of alcohol added.

Little Bits of Motor Wisdom

Pertinent Pointers for Repairman and Driver

WHEN THE NEW CAR ARRIVES.—The first thing that the delighted owner of a new car generally does is to start the motor going. This in reality should be about the last thing he does. A tag will often accompany the car stating that it has been put into such condition, as far as the lubricants are concerned, that a run of 300 miles may be undertaken without a renewal of the supply in the grease-cups or motor-oiling system. The proverbial grain of salt may well be taken with this statement, not so much on account of the fact that it is not apt to be true as that a mistake may be made which would cause a great amount of damage to the machine, if precautions in this respect are not made a habit as soon as it is purchased. Certain well-defined steps should be taken just as soon as the car arrives so that the new owner will be sure before he starts out with his new car that his pleasures are not to be nipped in the bud by an unforeseen accident.

When the car arrives the first step to take is to drain out the water which may be left in the radiator, Fig. 1, from the time that the car was tested at the factory. The radiator should then be refilled with fresh,

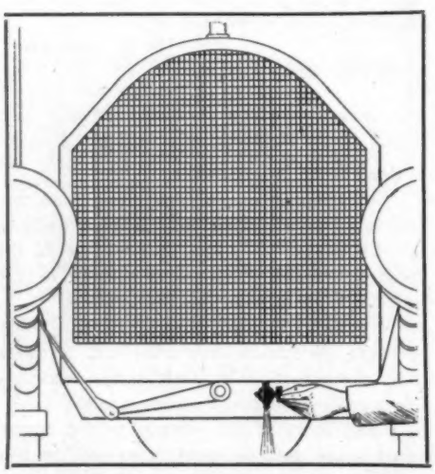


Fig. 1—Draining impure water from radiator

clean water, free from lime and all other impurities, Fig. 2. The gasoline tank and carbureter, Fig. 3, should then be treated in the same manner, all the gasoline taken out and the tank refilled by pouring the gasoline through a clean piece of chamois. When the radiator is refilled the water should always be passed through a screen or filter, so that the system will not be clogged by pieces of solid material. After the water and fuel systems have been replenished with clean material the next step is to refill the lubrication system. A new car will require a greater quantity of oil than will an older car which has fully found itself. The new owner should not spare the oil with the idea of economizing in this respect, as on a new car it will be found that the bearing surfaces have not worn to the same smoothness and snugness of fit that they will have after the car has been run for some time.

The oil is poured in the filler-hole of the reservoir until the proper level is reached. This will be shown by the level-gauge or level-cocks on the side of the oil tank. If the splash system of oiling is used the oil will be carried in the base. It would not harm in the latter case to pour a little more oil in the basechamber than was originally intended if the car has just been bought, even if it does make the car smoke a little. This is providing, of course, that the car is not in a municipality where the anti-smoke law is enforced rigidly or that the car is not in some place where the smoke will do any other harm. A few drops of oil should be put on the valve push-rods, Fig. 4, and all the grease-cups should be inspected to see that they are filled with non-fluid oil. They should then be given a turn. A few drops of oil should be dropped in the other oil holes all over the car and in such places as may occur to the owner as necessary. Before starting the motor it is well to open the drain-cock in the bottom of the carbureter and drain out any accumulated sediment. The gearshift lever should then be put in the neutral position and the switch put over on the battery side if batteries are used for starting purposes; if not, the switch should be put on the running position. The motor may then be cranked.

CARE OF WATER SYSTEM.—The cooling system should be thoroughly flushed out about every month or after the car has been run about 500 miles. This is on account of the lime deposit which gradually forms in the water. If the water is only replenished from time to time, as the supply is evaporated the supply which remains will become more and more foul until the efficiency of the radiator is greatly lessened owing to the amount of scale which will have accumulated upon the surface of the metal. About the best method in use for cleaning the radiator is to take a pail of boiling water and add to that a heaping handful of common soda. This should be poured into the radiator through the filler-hole and the engine started and allowed to run for a short time. The soda water is then drained out and fresh water allowed to run through the circulating system for a time. This water is then drained out and the radiator refilled. In this manner it

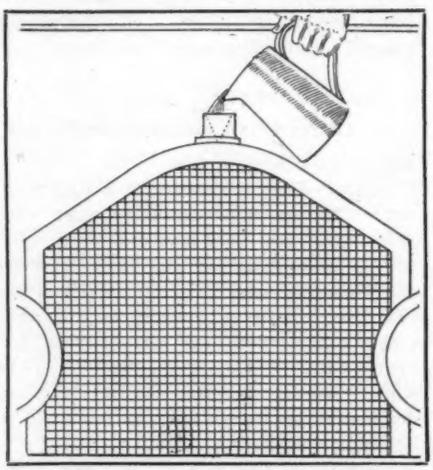


Fig. 2—Cleaning radiator with boiling soda solution

will be found that if the accumulation of foreign matter is not too great it will be completely removed. To avoid a stubborn accumulation of scale the above method of cleaning should be used faithfully after every 500 miles or after each trip where the water used in the radiator is of doubtful quality.

CARBON IN CYLINDERS.—The new driver hears so much about the evils of carbon deposit that his fears on this subject become to a great degree in the nature of a nightmare. These fears are played upon to a greater extent by the various tales that are heard concerning the deposits due to the use of poor lubricating oil. It is a fact that the poorer grades of oil will cause the sooty deposit, but the refinements that have been made in the manufacture of the oils used for automobile lubricating purposes make the driver really safe if he purchases any of the better grades of oil upon the market. The nature of the action of carbon deposit is also often misunderstood in spite of the fact that it is one of the things that a new motorist will probably hear most about.

The carbon flake, as it is called, consists of a very thin wafer of carbon which will generally be deposited on the cylinder

wall or on the head of the piston. If in the latter place it is generally harmless for a time except that it forms a gathering point for a further deposit of the same material. If it is on the wall of the cylinder it may give rise to a small leak in the compression owing to the compression of the piston rings as they pass over the deposit. As a rule, however, any losses which occur from this cause are so small that they may be neglected. Where the worst effects of carbon deposit may be noted is in the case where the accumulation becomes so thick that it causes preignition. The steps leading up to this condition are very gradual and it is not until the deposit has reached a very advanced stage that it becomes noticeable. The first indication of this will be a slight knock at low speeds.

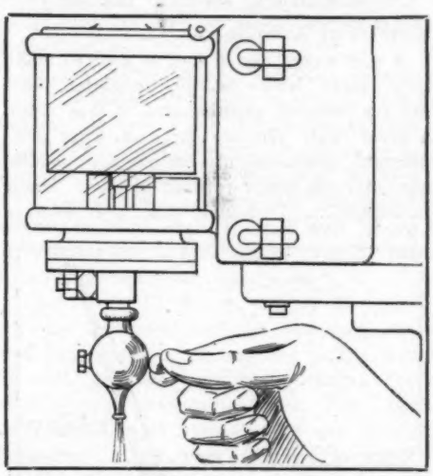


Fig. 3—Method of draining sediment from float chamber

When the first flake of carbon is deposited on some part of the metal in the combustion space, it will be kept cool by the iron with which it comes in contact. After a time another flake will be deposited over the first, increasing the thickness of the deposit. This process will be continued for a time until the deposit becomes so thick that a small cone of carbon is formed. This cone of carbon is submitted to the intense heat of combustion and gradually begins to glow. When the gas is compressed in the cylinder its temperature is raised and it is in a very favorable state for ignition, and hence is readily fired by the glowing point of carbon which is located in the cylinder.

As the piston rises on its compression stroke the gas may be fired before the piston has reached dead center. The effect of this may be readily seen. The piston is being lifted by the momentum of all the rotating parts of the motor and, in a multi-cylinder motor perhaps by the efforts of an explosion on some other cylinder. Opposed to this there comes an explosion in the affected cylinder which tends to force the piston against its direction of travel. The force of the explosion will sometimes stop the motor, but more often its efforts will be just overcome and the resulting shock will cause a knock that will be felt throughout the car.

Carbon deposits also belong in the category of troubles which may be for the most part eradicated by a little monthly care on the part of the person in charge of the car. A little kerosene left standing in the cylinder overnight will clean out the deposit very well, and if this is done faithfully in the time stated or after every 500 miles that the car has been run the owner will generally be free from any trouble of this nature. The motor should be freely lubricated after the kerosene has been used so that lubricating oil will be renewed at the points that have been reached by the kerosene.

CARE OF SPARK PLUGS.—One of the points on which troublesome deposits of carbon are apt to gather is on the sparking points of the spark-plug electrodes. The flakes of carbon are very apt to gather on the irregularities of the plugs and interfere with their functions. The spark cannot be expected to leap the gap between the two electrodes if there is a flake of carbon between them, and it is for this reason that they should be given an occasional inspection and cleaning, if such a step is found necessary. They may be cleaned very readily with a rag and a little kerosene and then wiped dry. When removing the plugs from the cylinder great care should be exercised that they are not broken, as a crack in the insulation will be coincident with the departure of all usefulness of the plug. There are many plugs so constructed that they are to a large extent self-cleaning.

The points of the plug should also be at the correct distance from each other. If they are too close the sparks will not be as effective in igniting the charge as they would be if the distance between the two electrodes were correct. If, on the other hand, the points are spread too far apart the spark is apt to be irregular, and, in the case where the current gradually decreases, as when dry batteries are used, the trouble may be very baffling and hard to locate. The distance between the two points should not be over 1-32 inch under any circumstances, as beyond this point the ignition would be very irregular and a high voltage would be very necessary in order to be powerful enough to make the spark jump the gap with any degree of certainty. A common method of testing the distance between the electrodes is to use a common visiting card or a dime worn thin. The card should just fit within the gap and the dime should be just a trifle too thick to pass in. In other words, if the card will not pass in the gap is too small, or, on the other hand, if the dime will pass in the gap is too large. Another precaution which is advised by careful motorists is to wipe all dirt and oil from the porcelain insulation before starting upon a trip.

The wiring should be kept free from grease and oil in order to preserve it in the height of its usefulness. The connections at the spark plug should also be inspected as the vibration from the motor is likely to shake them loose unless they are very carefully made. A loose connection at this point often makes a baffling misfire as the charge may be fired ten times without a miss and then on the next revolution the charge might not be ignited at all. The trouble caused in this manner is very often similar to that caused by a broken wire within the insulation. Very often the lugs are made with a locknut or other device for preventing the little knurled screw which holds the wire in position from being shaken loose. On most lugs, however, no such provision is made and the plug will often be disconnected owing to the shaking loose of the connecting wires. The rubber tubes which are on the market for the protection of the terminals are very useful in this respect and do a great deal of good in the way of preventing the troublesome disconnection of the plugs on hills or other spots where rough going is experienced. The chafing of the wires against a sharp piece of metal will often cause a short circuit against the engine frame which is ground. This may be readily avoided by supporting the wires.

WATCH THE BRAKES.—One of the worst things that can be caused by vibration of the car from the irregularities of the road is the change in the brake adjustment caused by the turning of the turnbuckle which is designed to regulate the adjustment on this part of the mechanism. The turnbuckle regulates the tension which will be put upon the brakes when they are applied. If it is jarred around so that it loosens this tension the driver will find to his dismay that the brakes will not hold on descending a hill or in other cases where they might be applied.

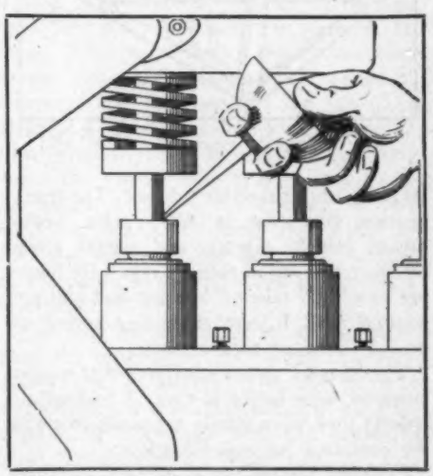


Fig. 4—A few drops of oil on the tappets

My Best Repair

Temporary automobile repairs made by the driver or owner while on the road and permanent repairs made in the garage after the run is over, are interesting to all automobile owners.

It may be a spring leaf has broken; a shackle bolt or strap may break; a steering tie rod is bent; the car skids into a curb and bends a steering arm or the starting crank; a throttle or magneto connection breaks owing to vibration; a radiator leak is started by a stone or some other means; a leak in the gasoline tank is discovered; there is a small hole in the gasoline feed line; a brake facing may burn out; a brake connection breaks; a front axle gets slightly sprung; a clutch starts slipping, or any one of a thousand things may happen.

Every automobile owner is interested in knowing how repairs have been made, how long it took to make them, how much they cost, and by whom they were made.

We want you to write in simple language in a letter what repair of this nature you have had to make, how you made it, how long it took you and how much it cost.

You can make with your lead pencil one or two rough sketches indicating the broken or damaged part and showing how the repair was made.

rThe experience of each reader is interesting to every other reader. Analyze your past experiences and send in one or two of them.

Give your name and address, legibly written. If you do not want your name to appear, make useo f a nom de plume.

Editor THE AUTOMOBILE.

A Pacific Coaster's Views

EDITOR THE AUTOMOBILE:

If I should do all the little things in tinkering with my machine as per instructions, I could find something to do all the time. One could at any time find a cut or hole in his tires to plug up, while lamps will stand cleaning and polishing any time. Why can't they be colored in some way that they won't soil so easily? If one fails to look every part of his machine over once or twice daily something will get loose or rattle; especially will the lock nuts in the hub and hub caps back off and ruin the threads by jamming. Radiator gets leaky, the exact spot no man knoweth; the wiring system will lie across some piece of iron and in a short time rub the insulation off and you know the rest. The gas feed pipe rides on the sharp end of a bolt which rubs a hole in it. The crankcase leaks

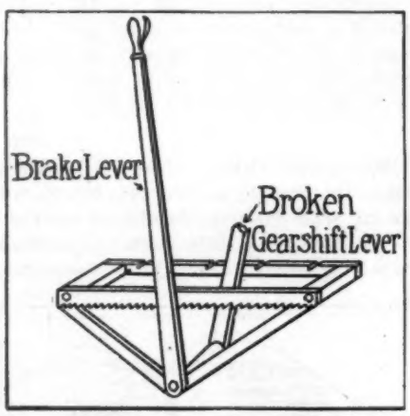


Fig. 1—Way in which lever broke off

oil badly and it shouldn't do so. The transmission gear case is filled with heavy grease which digests and passes along the duct or torsion tube to rear axle housing so when I take off hub cap and pull out floating axle, I have an oozing spring of grease for some time to come.

The hangers on my subframe that engine rides on both broke in two. I had no accident; they were simply too weak to stand the continual jar and vibration.

I found piston rings in two cylinders that had poor compression. They were not lapped and ground in as the company claimed they had been, as the grinding marks were there to show that they were not fitted to the 1000th of an inch by working up and down in cylinder with piston; the marks showed that the grinding was at right angles to cylinder and at some places the rings would only rub the walls at the edge of the ring instead of all over. If my car was as carefully inspected as the company claimed it was and tried out, the tester must have had poor eyesight or tried it out on a joy ride on a dark night.

H. W. SCOTT.

Forest Grove, Ore.

Broke Gearshift Lever

Editor THE AUTOMOBILE:

While leaving an aviation meet at Belmont Park on Long Island one fall, I was caught in a jam of automobiles, and in shifting from high to first, you can imagine my surprise when I found the gearshift lever loose in my hand. It had suddenly snapped off an inch or two above the quadrant over which it played. I had fortunately passed into first speed, and keeping in that gear, I managed to get out of the crown and onto a side road. I was some 15 miles from home, and by whatever route I might choose, I had to pass through a crowded section of Brooklyn. It was late, and the prospect of a long drive home on first speed was not pleasant. I could find no wrench in the tool kit, nor any other tools which would bridge over the difficulty, and as I had a heavy load in my light car, I knew I could not start on high gear and drive the entire distance on that speed. It was Sunday and no handy blacksmith could be found.

A solution to the difficulty was finally reached, and I disconnected the emergency brake lever and wired it to the stub of the gearshift lever. The car had a progressive system of gears, permitting me to wire the levers in this way. By means of this makeshift I was able to drive into Brooklyn, and later to a New York garage.

New York City. F. D. MARTIN.

Overcoming Weak Battery

Editor THE AUTOMOBILE:

A few weeks ago I was in a small summer resort, which is only inhabited during the summer months, and so was alone a great deal. On one occasion, after considerable unsuccessful cranking, my usually easy-starting motor refused to start. Upon investigation, I found that my storage

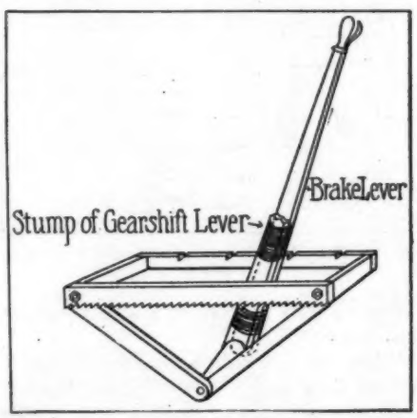


Fig. 2—Brake lever wired to stump of gearshift lever

battery was weak and that it would not operate the vibrators of my trembler coil. But, on further looking into the matter, I found that by rapidly "tickling" with my finger the vibrator through which the current was flowing, I could assist the weakened battery sufficiently to produce a small spark. But, being all alone, I could not crank the motor and work the vibrator at the same time. Having a motor which was accustomed to start itself whenever it contained a good combustible charge, I finally hit upon the scheme of drawing some gasoline from the carbureter and giving each cylinder a generous charge. Then, turning cylinder No. 1 up into firing position, I switched on the current and, by rapidly working the vibrator, I succeeded in getting an explosion. Then as rapidly as possible I successively worked the vibrators of cylinders Nos. 3, 2 and 4 until I had the motor running at enough speed to switch on the magneto.

Elmer, N. J. P. S. FOSTER.

My Ideal 1912 Automobile

Readers' Conceptions of What This Year's Car Should Be

An Ideal Roadster

EDITOR THE AUTOMOBILE:

By close observation and study of the various models and types of roadsters I find that it takes greater skill to work out a proper design for the two-passenger car than for the four or five-passenger touring type. By proper design I mean something that has class and pleasing lines to its style as well as being correct mechanically.

As the automobile is rapidly passing from the sphere of luxury to that of commercial usefulness, the two-passenger type is becoming more popular. Insurance men, salesmen, doctors and inspectors, in fact all persons using a horse and one-seated vehicle in their business, can well afford to consider the two-passenger type of car from an economical standpoint.

What I would like to see on the market is a medium-priced two-passenger car, one that would be economical in the way of fuel, oil and tire wear—neither too small nor inconsistently large. I do not know of a better term than to say "a *big* little car."

Often the manufacturer builds a small car out of good material, but slights the job in every respect when it comes to small details. For instance, instead of the spring bolt heads being dressed down and fitted with oil cups they are left rough, without cups, having a finish about equal to a mail-order-house buggy spring. A small, ill-shaped steering wheel is placed on top of a sheet-iron post, and lamps made of the thinnest brass are used. Why not put on the cups at an extra cost of five cents each, and a nice 18-inch wheel with brass or nickel post and lamps that add to the appearance rather than detract? It is true that some prospective purchasers will not notice such points, but it is also true that sales are lost because of these earmarks.

As to specifications in which I would carry out above idea, I will say that the body should be the armored torpedo style, having a door in the rear admitting a suit case or other luggage; 3¾ inch by 5¼ inch motor; cylinders cast separately; L-head with valve springs inclosed; pump and splash oiling; thermo-syphon cooling with cellular radiator; fiber-faced cone clutch with cork inserts; three-speed transmission; control on inside at driver's right; spark and throttle on steering wheel; semi-elliptic front and three quarter elliptic rear springs; 110-inch wheelbase; 32-inch by 4-inch tires; full equipment, consisting of mohair top, wind shield, Castle lamps, gas tank, speedometer and clock.

The above described car can and should be sold for a price not to exceed $900, including the equipment. T. C. KABEL.

Modoc, Ind.

Readers continue to demonstrate their interest in the ideal car and the specifications which are submitted show a wide range of taste and requirements. In view of the interest shown the Editor continues to extend the invitation to all who entertain ideas on this absorbing topic to submit their opinions for publication. The description should be legibly written on one side of the paper and signed by the sender, although if it is so desired the name will not be published.

Believes in Air-Cooling

Editor THE AUTOMOBILE:

I will give you my idea of a 1912 car. It should be a six-cylinder car, the cylinders being cast in pairs and large enough to develop not less than 32 nor more than 34 horsepower. I would prefer that the crankcase be built so that the bottom part could be dropped from about half way up on each side. I would want an automatic oiling system, multiple-disk clutch running in oil, either Bosch or Splitdorf magneto, three speeds forward and reverse, selective transmission and straight line drive when the car is loaded. I would prefer an air-cooled engine, as I cannot see why 600 or 800 pounds of extra metal and water should be carried when air will do the cooling better. The wheelbase should be not to exceed 110 inches and the wheels should be of the artillery type, 36 inches by 4 inches. I would want left-hand drive and right-hand control, the steering wheel being 18 inches in diameter. Throttle control should be on top of the wheel, and the clearance should be at least 16 inches. I would prefer 18 inches.

The body should be a four-passenger torpedo with detachable rims and elliptic springs. The car should be shaft-driven and its weight should not exceed 2,000 pounds.

There should be a self-starter of the compressed-air type with an auxiliary air tank, check-valve and other apparatus necessary to the system.

Equipped with top, windshield and electric lights, and having gun metal trimmings, this car should be built for between $1,200 and $1,500. E. W. JORDAN.

Palisade, Col.

By Way of Repartee

Editor THE AUTOMOBILE:

In reply to the criticism of Mr. Barry MacNutt with reference to my description of an ideal car which appeared in your issue of October 26, 1911, I have this to say. I did away with a carbureter and also a throttle on an old-style runabout with a 4½-inch by 6-inch engine rated at 7 horsepower. I ran this car all last summer with a fuel composed of one-half gasline and one-half kerosene, making over 30 miles an hour, as against the car's previous 20 miles when conventionally fitted. The same engine ran equally well without further adjustment on either kerosene, alcohol or crude oil (as it comes from the wells). I used two spark plugs in series.

Mr. MacNutt came to the erroneous conclusion that I advocated the ridiculous. On what grounds, pray? As to the placing of mudguards, he overlooked the fact that one of them is permanent and is designed to protect the occupants against everything but storm. It was left permanent since its construction offered no wind resistance. It would take no more time to place mudguards of this kind in place than it would to place storm curtains on any other car. Had Mr. MacNutt but thought, if that car were his own, he could then have left the mudguards in place at all times, if he so desired. But it has been shown that 11 horsepower are needed to overcome the resistance of the air when going at a speed of 40 miles an hour. To save three of the 11 horsepower by taking down the guards will interest those who can afford to buy a car but not to own one. Mr. MacNutt's letter shows that he does not belong to that multitude, because of the carefree way in which he throws a brickbat.

The first innovation in my car is based upon my experience, the second upon the observation of others. For the third I am indebted to Mr. MacNutt for his suggestion. I did away with the planetary gearbox altogether. With him, I say, "Why gears?" Instead, I use a selective system, each speed being a direct drive—three speeds ahead and reverse.

No matter how well a thing is understood, the mere viewpoint of someone, sometimes called a discovery, sometimes an invention, may upset past beliefs. The properties of radium as observed and interpreted have destroyed the views heretofore held concerning natural laws.

New York City. P. G. TISMER.

Digest of the Leading Foreign Papers

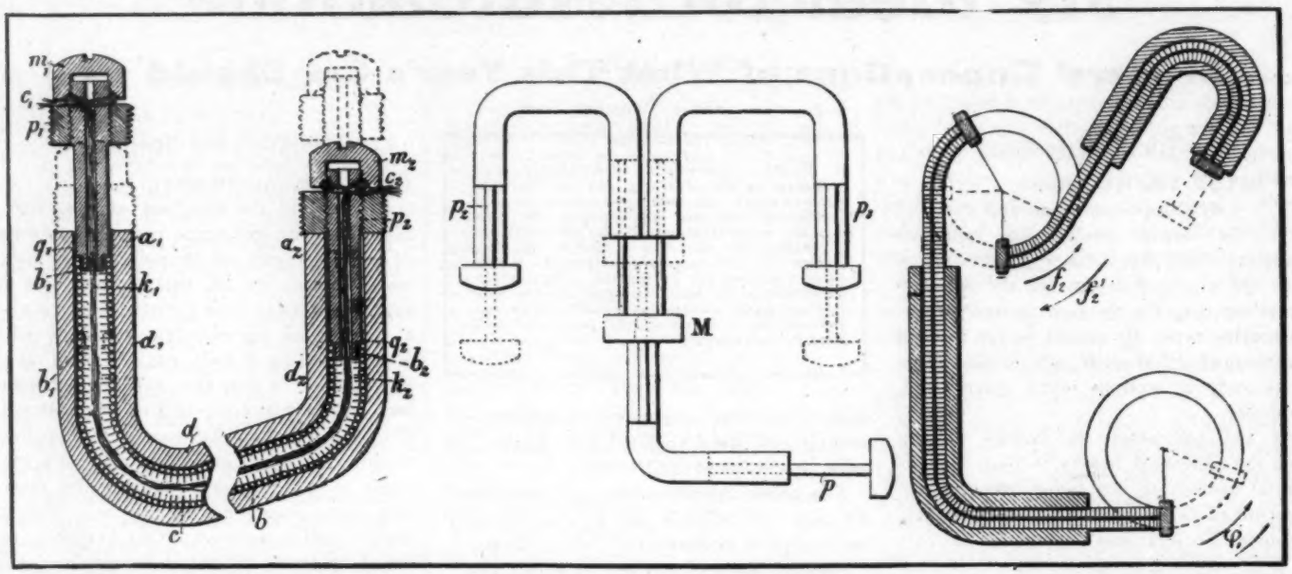


Fig. 1—The Herzmark curvilinear transmission of movement

Fig. 2—Herzmark wire with three terminal posts

Fig. 3—Arrangement for transmitting circular and multiple movements

Curvilinear Transmission of Movements

AN IMPROVEMENT in devices for transmitting movements over a more or less sinuous path by mechanical action has been perfected by a Mr. Herzmark. It recalls the Bowden wire transmission, but is more elaborate and should serve in a correspondingly wider field of applications. It transmits a push as well as a pull, so that retractor springs are dispensed with, and has been applied in cases where the resistance reached 1,000 kilograms, the frictions involved in its operation being relatively small. The Metropolitan street railway system in Paris has subjected the device to extensive testing. In the shops of the company 450,000 pulls and an equal number of pushes, each covering a displacement of 1 meter, effected over a path with two right angle turns and involving an effort of 10 kilograms, were made at the rate of eighteen double movements per minute during a period extending over two and one-half months without any greasing or other attention to maintenance, and at the end of the period the wear at the most exposed points of sheath *b* was insignificant. [The report is silent on the wear of the inclosing tube at the turns.] Subsequently the same company used the device for the opening and closing of both the middle and the end doors in one test car placed in regular passenger service over its system, the object being to permit all doors to be operated by one attendant stationed at the middle. In practice, however, the passengers usually operate the end doors themselves by means of the handles, and the device serves only to synchronize all the opening and closing movements. Other experiments have been recently undertaken by a railway company with a view to using the device for controlling the electrical contacts by which the switches and frogs are operated and which had proved liable to derangement from the vibration of the rails. Trials of the system for the firing of cannon at a distance on shipboard, as well as for various uses in connection with automobiles and aeroplanes, are also in progress.

The Herzmark transmission works in a drawn red copper tube, d, d_1, d_2, Fig. 1, which is rigid, once installed in service, but may be bent into very sinuous shapes with turns of down to 2 millimeters radius. Within this tube there is placed with small play a flexible sheath wound with steel wire, b, and this incloses, with considerable play, a thin cable, c, c_1, c_2, on which there is wound a helical thread of very steep pitch. At each end of the sheath, b_1, b_2, which is shorter than the copper tube, there is secured by means of a little shoulder-and-sleeve joint a brass piston, p_1, p_2, of a length a little greater than that of the movement to be transmitted. These pistons are bored to admit the snug passage of the thin steel cable c, the ends of which, c_1, c_2, are held fast to the ends of the pistons by means of threaded caps, m_1, m_2. The cable is tightened until the surface of the wire winding of sheath b becomes continuous. The pistons and the sheath thus form an element which is rigid under push, while capable of bending around the turns of the conduit, and a push is transmitted by direct action of the pushed piston on the end of the sheath, and from the latter upon the piston at the opposite end. A pull at one end, on the contrary, is transmitted through the cable c to the piston at the other end, and from this reacts upon the sheath as a back push. When the device is installed the sheath with its cable is introduced in the copper tube before the latter is bent to its path, the sheath being first greased, more to obviate rusting than to reduce friction in the operation of the device.

Fig. 2 shows an arrangement for transmitting a pull or push from one point at two other points simultaneously by joining two conduits upon one junction block M. It will be noticed that while by this arrangement pistons p_2 and p_3 may be pulled or pushed from piston p_1 at the same time, a pull at one of the co-ordinated posts, p_2, for example, will at the same time pull p_1 and push out p_3. The device can thus be used for effecting contrary movements at various points of an installation.

Fig. 3 shows a method of transmitting rotary movements not exceeding one turn of a pulley. An arc of the pulley face, corresponding in length to the length of the desired movement, must to this end be inclosed to form a curved tube, which takes the place of the rigid piston. If it is desired to transmit a movement over a multiple or very tortuous path, the diameters of the pulleys may be increased to diminish the friction, the latter depending upon the total angle covered on the different pulleys. Evidently the device may be arranged with a straight piston at one point and a pulley or so-called sigma attachment at other points, so that a rectilinear movement—push or pull—

may be transformed into a circular movement at one or more other points, or *vice versa*.—From *Le Génie Civil*, December 16.

MACHINE FOR TESTING OIL.—A series of curves indicating those variations in the lubricating qualities of different oils which arise, for each of them, under variations of temperature, of load pressures and of the duration of the load pressures, are reproduced in the *Zeitschrift des Vereines Deutscher Ingenieure* for September 9. These curves were made from the charts produced with the Ossag oil-testing machine which is constructed to draw a curve representing the lubricating value of an oil and arranged to be operated with the oil and the bearing under any one of a number of predetermined conditions which simulate those met in actual practice. The oil may be cold or hot, with temperatures ranging up to those obtaining in automobile motors and Diesel engines, or it may be subject to the influence of water, saturated or superheated steam or to dry heat, while the bearing may be subjected to widely varying pressures. This machine is shown in its essential features in the accompanying elevation and plan views, Fig. 4. Two cylindrical blocks *A* and *B* are placed end to end within a jacket *C*, into which may be passed hot air, steam or hot water by way of the pipes *D*, *E* and *F*, or which may be heated by means of the gas flat *G*. The oil to be tested is introduced between the blocks *A* and *B*, whose contact faces are very accurately adjusted to one another. The working pressure is regulated by means of the spring balance *I* and the lever *Z* and the variations of the temperature of the oil are recorded by means of the long registering thermometer *TT*. A rotating movement is communicated to the lower cylinder *A* through the pulley *W*, the shaft *V* and a pair of bevel gears and its speed is measured by the tachymeter *X*. The cylinder *B* is, on the other hand, turned around its axis solely by the friction generated, and the angle of its movement being effected against the increasing tension of a spiral spring, furnishes therefore a measure of the lubricating quality of the oil under test for any given set of conditions. The variations of this movement, co-ordinated with the rotary speed of *A*, are inscribed by a stylus *H* on a roll of paper *P*, which is synchronized with another roll on which the thermograph registers the variations of temperature, both being unrolled by a friction roller moved by a worm gear at the end of shaft *V*. The apparatus is also provided with a small boiler which furnishes, at will, wet or superheated steam under a pressure which may be raised to 25 kilograms per square centimeter.—From *Le Génie Civil*, December 16.

BLACK COATING FOR YELLOW BRASS.—If it is desired to dress up shining yellow brass articles in a somber black, as is at present frequently the case in the automobile industry, and if it is not considered advisable to copperplate them first, it is usually a solution of copper carbonate in sal-ammonic which is used for the purpose. Recipes for the process are offered in four forms as follows:

mobile and Accessories Show.

Jan. 22-27.....Dubuque, Iowa, Annual Show Dubuque Automobile Dealers' Association.

Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show, under the auspices of the National Association of Automobile Manufacturers. Pleasure cars, first week. Commercial vehicles, second week.

Jan. 27-Feb. 10....Pittsburgh, Pa., Sixth Annual Show, Automobile Dealers' Association of Pittsburgh, Inc. Pleasure cars, first week. Commercial vehicles, second week.

Jan. 29-Feb. 3.....Scranton, Pa., 13th Regiment Armory, Second Annual Show.

Feb. 1-7.....Washington, D. C., Annual Show, Convention Hall.

Feb. 3-10.....Montreal, Canada, National Show, Drill Hall, Automobile Club of Canada.

Feb. 3-10.....Harrisburg, Pa., Third Annual Show, Arena.

Feb. 5-10.....Buffalo, N. Y., Convention Hall, George C. Fehrman.

Feb. 5-17.....St. Louis, Mo., Coliseum, Annual Show, Pleasure cars first week. Commercial vehicles, second week.

2—Dr. Langbein recommends the following: Dissolve fresh carbonate of copper in strong spirit of sal-ammoniac till an excess of carbonate remains undissolved. Dilute with one-fourth volume of water. Add 2 to 3 grams of graphite for each liter and heat to 35° to 40° C. The article is allowed to remain in the solution a few minutes, is then rinsed in cold water, dipped in hot water and dried in sawdust. The solution soon precipitates black oxide of copper and becomes useless. No more should therefore be prepared than can be used at once. The articles retain their luster.

3—Copper carbonate, 100 weight parts, is dissolved under repeated stirring in 750 weight parts of spirit of ammoniac and then 150 parts of water is added. This lye must be kept in a broad glass basin under cover of a glass plate, the ground edge of the basin being greased to effect an air-tight joint. By adding spirit of sal-ammonia a weakened lye can be restored. The thoroughly cleaned article is suspended by a brass wire for two to three minutes in the liquid, moved to and fro, then rinsed in clean water and dried in sawdust. For small articles it is advisable to heat the lye.

4—Buchner advises to dissolve 100 grams of carbonate of copper in 750 grams of spirit of ammonia and to leave the solution standing for a few days with frequent shaking. Graphite may be added.—From *Der Praktische Maschinen-Konstrukteur*, November 16.

RUBBER IN ANY COLOR.—All that is necessary for overcoming the difficulties which have heretofore existed in imparting any desired and permanent coloring to vulcanized rubber articles is first to mix the gum with the desired coloring substance, as usual, and then to add 1/200 part of iodine. By virtue of the iodine, according to French patent to Francois Paulet, the vulcanization will come out perfect, by whatever approved method it is done.—From *Chimie Industrielle*, Feb.

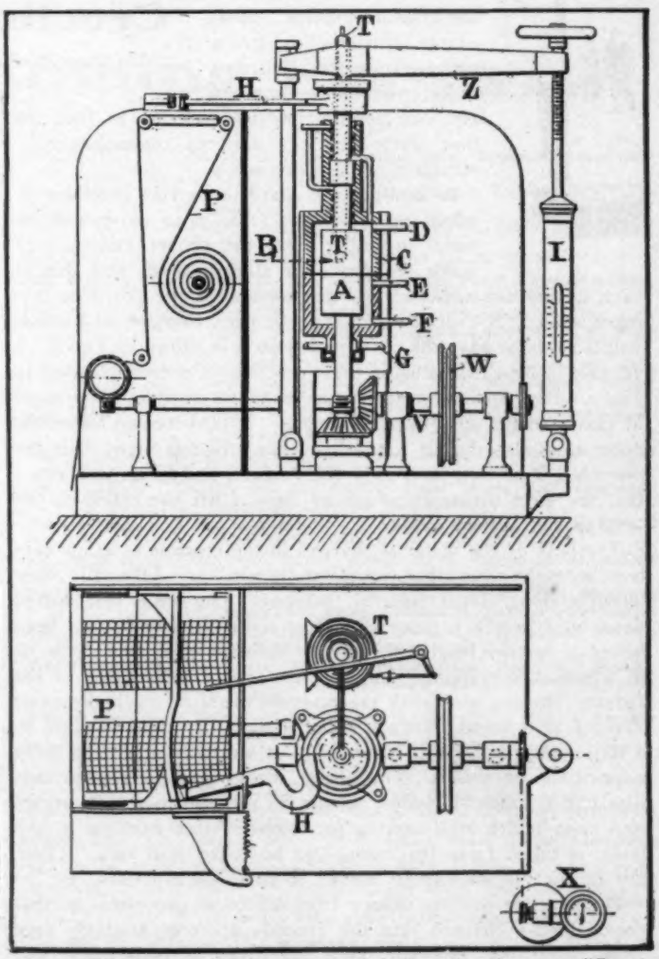


Fig. 4—The Ossag machine for testing lubricating oil under many different working conditions

Automobile Metallurgy Made Easy

By E. F. Lake

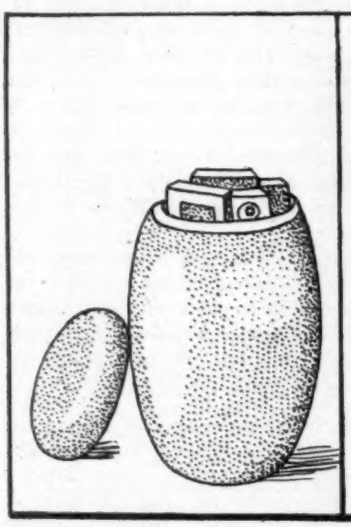


Fig. 1—Material charged in crucible

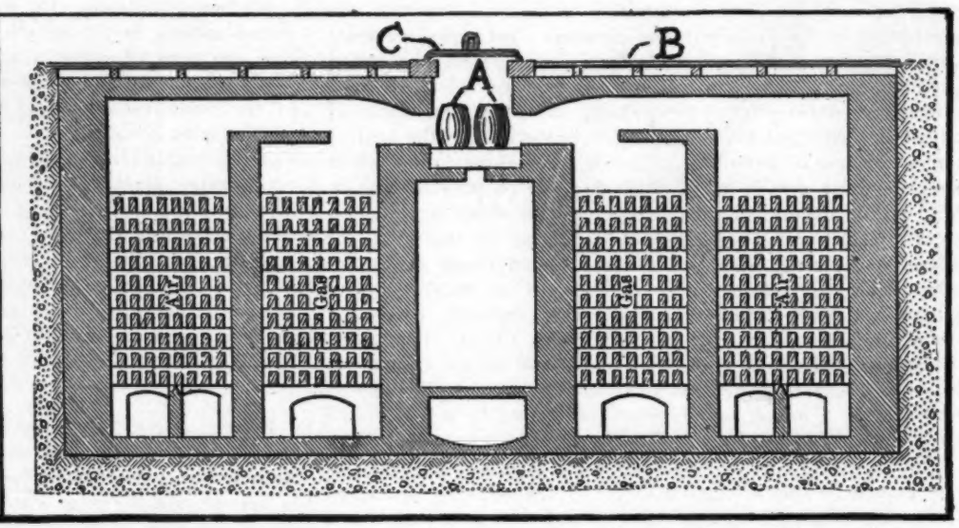


Fig. 2—Sectional plan of regenerative crucible furnace

Part VIII
Crucible Steel

(Next Week—Electric Furnace Steel)

THE very highest grades of carbon steels are made by the crucible process. Most of the special alloy steels, such as nickel, chrome nickel, vanadium, titanium, etc., are also crucible-made steels. In fact, the best steels that are used in automobile construction are crucible steels.

In this process graphite or clay crucibles in which can be melted from 50 to 100 pounds of metal are filled with the proper materials to make the grade of steel desired, and this is then melted down, boiled and poured out of the crucibles into ingot molds. A crucible that has just been charged with metal and is ready to have the cover sealed on it is shown in Fig. 1. A furnace in which the steel in these crucibles is melted is shown in Fig. 2. The regenerator apparatus below the crucibles is the same as that used for open-hearth furnaces. This is located below the floor, as is also the pit for the crucible. In this view, A is the crucibles, B an iron floor over the furnace, and C, an iron cover that the steel maker takes off so he can lift the crucibles out with special shaped tongs.

The bulk of the material charged in the crucible is a low-carbon wrought iron that is called muck bar. Like all other wrought irons, this is made by puddling. The ore is first melted down in a hearth furnace and after the molten metal has been boiled a certain length of time, it becomes cool enough to be in a plastic condition. Puddlers then shove long rakes in the furnace opening and work the mass of metal in much the same manner as a woman kneads bread dough. By thus working it, a large part of the slag is worked out and with it goes a large part of the impurities. The silicon, manganese and carbon oxidize out in much the same manner as they do in the Bessemer and open-hearth steel-making processes. After working it, the metal is taken from the furnace to be rolled into bars. These are cut up into sizes small enough to go in the crucibles.

The crucible process differs from all other processes, in that the materials charged into the crucible are comparatively free from impurities; especially such impurities as phosphorus and sulphur. Another great difference is that the metal put in the crucibles for making into steel has a very low carbon content instead of the excessively high carbon percentage of the cast iron that is charged into the Bessemer converter or open-hearth furnace. It is not necessary to boil or oxidize out any of the carbon, therefore, but, to obtain the correct percentage in the finished steel, enough charcoal is charged with the low-carbon metal.

When the crucible is filled, the cover is sealed on tightly and it is submitted to the heat in the furnace until the materials have been melted down and boiled long enough to purify themselves and become thoroughly mixed. It will thus be seen that the ingredients of the finished steel will be in the same proportions or percentages as are the materials that are charged in the crucible. A small amount of purifying metals can be put in the crucible to form a slag that will float to the top of the metal when it becomes molten, and then absorb a considerable part of the impurities when they boil up to the top. This, however, cannot be carried out to any great extent.

Such injurious elements as sulphur and phosphorus cannot be removed from the metal. Hence materials that are low in these must be charged in the crucible. As the crucible is sealed tightly, the gases from the atmosphere cannot penetrate the metal, nor can those that are the products of combustion. Thus crucible steel is freer from occluded gases or those that

or pushed from piston p_1 at the same time, a pull at one of the co-ordinated posts, p_2, for example, will at the same time pull p_1 and push out p_2. The device can thus be used for effecting contrary movements at various points of an installation.

Fig. 3 shows a method of transmitting rotary movements not exceeding one turn of a pulley. An arc of the pulley face, corresponding in length to the length of the desired movement, must to this end be inclosed to form a curved tube, which takes the place of the rigid piston. If it is desired to transmit a movement over a multiple or very tortuous path, the diameters of the pulleys may be increased to diminish the friction, the latter depending upon the total angle covered on the different pulleys. Evidently the device may be arranged with a straight

with any of the other processes, and as the air is entirely excluded from the steel when melting, a much finer grade of steel can be made than with either the Bessemer or the open-

hearth. For that reason nearly all of the highest grade steels that are used in motor car construction are made in this manner, even though they cost double the price.

When an effort is made to make the car as light and strong as possible, the best of steels must be used for all of the important parts. Crankshafts, propeller shafts, transmission gears and their shafts, differential gears, driving gears, steering knuckles and their connecting-rods, etc., have been made from the highest grade of steels obtainable, namely, the nickel-chrome steels. In order to get the greatest strength out of these steels they have been made in crucibles as then it was possible to reduce the impurities to the lowest percentages and many times to mere traces. When present in quite small percentages the impurities are very destructive of the static and dynamic strengths of all steels and hence all kinds are made in crucibles.

Many of the vital parts of an automobile are made from the ordinary carbon steels that have been made in crucibles, as their mechanical properties can thus be greatly improved. These steels would be considerably cheaper than any of the alloy steels mentioned above and at the same time they would have quite high strengths, wearing qualities, etc.; considerably higher than the ordinary steels purchased. The difference in price between open-hearth and crucible steels is a great temptation on the part of dealers to sell open-hearth steels for crucible steels. It is, however, the business of the automobile builder to see that he gets crucible steels when he orders them and pays their prices.

As the crucible process of making steels is the most expensive, only high grades of steels are made in crucibles. Low-carbon steel is never made in crucibles unless a low carbon content is desired in some of the special alloys that are made. Thus, nickel-chrome, nickel, vanadium or titanium steels might be made with a low carbon content by the crucible process, in order to get a high grade of steel for case-hardening purposes. As the impurities are also removed to low percentages, it is not difficult with some of the high grades of crucible steels to obtain a tensile strength that is close to 300,000 pounds per square inch and an elastic limit that will approach 250,000 pounds. In fact, by using a little extra care in manufacturing steels in the crucible, these figures have been exceeded. Crucible steels, therefore, can be obtained with nearly any mechanical property that is required, within the limitations of which the metal is capable.

STRONG FIBER GEARS.—Several German gear makers employ a material known as Unica Paper, which is made in Sweden only, for gears, in preference to rawhide or hardened fiber. At the Station for Tests of Materials at Gross-Lichterfelde tests were made to decide the pressures at which gear teeth of the three materials mentioned became permanently deformed and those at which they were broken. The Unica material gave 400 kilograms elastic limit and an ultimate strength of 538, the rawhide 250 and 356 kilograms, respectively, and the fiber teeth 280 and 422. Under a Brinnell test for hardness the Unica material registered 12 under a prssur of 200 kilograms, but this figure dropped to 11.4 under a pressure of 250 kilograms. Rawhide registered only 7.8 under the lower pressure, but this rose to 8.2 under the higher. The hardness number for the fiber similarly rose from 6.5 to 7.2.—From *Werkstattstechnik*, December.

Calendar of Coming Events

Shows

Jan. 6-13.....New York City, Madison Square Garden, Twelfth Annual Show, Pleasure Car Division, Automobile Board of Trade.

Jan. 6-20.....New York City, Madison Square Garden, Annual Show, Motor and Accessory Manufacturers.

Jan. 10-17.....New York City, Grand Central Palace, Twelfth Annual Show, National Association of Automobile Manufacturers; also Motor and Accessory Manufacturers.

Jan. 13-19.....Milwaukee, Wis., Auditorium, Fourth Annual Show, Milwaukee Automobile Dealers' Association.

Jan. 13-27.....Philadelphia, Annual Show, First and Third Regiment Armories, Philadelphia Automobile Trade Association.

Jan. 15-20.....New York City, Madison Square Garden, Twelfth Annual Show, Commercial Division, Automobile Board of Trade.

Jan. 15-20.....Toledo, O., Annual Show, Terminal Building, Toledo Automobile Dealers' Association.

Jan. 22-27.....Rochester, N. Y., Annual Show, State Armory, Rochester Automobile Dealers' Association.

Jan. 22-27.....Detroit, Mich., Wayne Gardens. Eleventh Annual Show, Detroit Automobile Dealers' Association.

Jan. 22-27.....Providence, R. I., Providence State Armory, Rhode Island Licensed Automobile Dealers' Association, Automobile and Accessories Show.

Jan. 22-27.....Dubuque, Iowa, Annual Show Dubuque Automobile Dealers' Association.

Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show, under the auspices of the National Association of Automobile Manufacturers. Pleasure cars, first week. Commercial vehicles, second week.

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Feb. 1-7.....Washington, D. C., Annual Show, Convention Hall.

Feb. 3-10.....Montreal, Canada, National Show, Drill Hall, Automobile Club of Canada.

Feb. 3-10.....Harrisburg, Pa., Third Annual Show, Arena.

Feb. 5-10.....Buffalo, N. Y., Convention Hall, George C. Fehrman.

Feb. 5-17.....St. Louis, Mo., Coliseum, Annual Show, Pleasure cars first week. Commercial vehicles, second week.

Feb. 10-17.....Atlanta, Ga., Auditorium-Armory, Atlanta Automobile and Accessory Dealers' Association.

Feb. 12-17.....Ottawa, Ont., Howick Hall, Annual Show, Ottawa Valley Motor Car Association.

Feb. 12-17.....Kansas City, Mo., Annual Show, Combined Association of Motor Car Dealers.

Feb. 12-17.....Troy, N. Y., Second Annual Show, State Armory, Troy Automobile Dealers.

Feb. 12-19.....Dayton, O., Third Annual Show, Dayton Automobile Club.

Feb. 14-17.....Grand Rapids, Mich., Third Annual Show.

Feb. 17-24.....Pittsburgh, Pa., Second Annual Show, Exposition bldg., Pittsburgh Auto Show Association, Inc.

Feb. 17-24.....Newark, N. J., Fifth Annual Automobile Show, New Jersey Automobile Exhibition Company, First Regiment Armory.

Feb. 17-24.....Minneapolis, Minn., National Guard Armory and Coliseum, Annual Automobile Show, Minneapolis Automobile Show Association.

Feb. 19-24.....Omaha, Neb., Seventh Annual Show, Auditorium, Omaha Automobile Show Association.

Feb. 19-24.....Hartford, Conn., Annual Show, Automobile Club of Hartford, State Armory.

Feb. 19-24.....Cincinnati, O., Annual Show, Music Hall, Cincinnati Automobile Dealers' Association.

Feb. 20-24.....Binghamton, N. Y., State Armory, Third Annual Show, Automobile Dealers' Association.

Feb. 20-28.....Baltimore, Md., Annual Show, Baltimore Automobile Dealers' Association.

Feb. 21-24.....Louisville, Ky., Fifth Annual Show, First Regiment Armory, Louisville Automobile Dealers' Association.

Feb. 21-28.....Toronto, Ont., Annual Show, The Armouries, Toronto Automobile Trade Association.

Feb. 24-March 2....Brooklyn, N. Y., Twenty-third Regiment Armory, Annual Show, Brooklyn Motor Vehicle Dealers' Association.

Feb. 26-Mar. 2.....Elmira, N. Y., Second Annual Show, Elmira Automobile Club.

Feb. 26-Mar. 2.....Paterson, N. J., Annual Show, Fifth Regt. Armory, Paterson Automobile Trade Association.

Feb. 26-Mar. 3.....Quincy, Ill., Highland Park Stone Pavilion. Annual Mississippi Valley Show, Quincy Auto Club.

Feb. 28-Mar. 2....Davenport, Iowa, Annual Show, Davenport Automobile Association.

March 2-9.....Boston, Mass., Tenth Annual Show, Boston Automobile Dealers' Association, Inc.

March 4-9.....Denver, Col., Auditorium, Annual Show, *Motor Field*.

March 6-9.....Tiffin, O., Second Annual Show, The *Advertiser*.

March 12-16.....Syracuse, N. Y., Fourth Annual Show, State Armory. Syracuse Automobile Dealers' Association.

Meetings, Etc.

Jan. 18-19.....New York City, Madison Square Garden, Annual Meeting Society Automobile Engineers.

NEWS of the WEEK CONDENSED

New Velie revolving-body dumping truck demonstrated in Boston, Mass.

BOSTON, MASS.—The local branch of the Velie is demonstrating the new Velie revolving coal-dumping body to coal dealers, contractors and other business men who are interested in trucks. The body operates on a turntable so that the load may be shot in any direction desired. When in operation the truck is parallel with the sidewalk, thus doing away with the objectionable features of obstructing traffic and jarring the machine by backing it into the curb.

PHILADELPHIA.—The Motorette Company, of Philadelphia, has changed its name to the Lion Sales Company.

NEW YORK CITY—A service and repair department has been opened by the local branch of the Marquette Motor Company.

CLEVELAND, O.—James A. Harris, Jr., has been promoted from the sales department of the White Company to the position of advertising manager of the company.

LOS ANGELES, CAL.—The American Silent Motor Company is preparing to erect an automobile factory to cost $2,000,000 in this city. I. T. Bush is interested in the company.

PHILADELPHIA.—Y. W. Ralph has again taken title to the newly built garage on the corner of Nineteenth and Norris streets. He conveyed the title to David Lavis last June.

SAGINAW, MICH.—The Duryea Auto Company has changed its name to the Brooks Motor Wagon Company, and will continue to manufacture light delivery wagons under that name.

PHILADELPHIA. — The Thornton-Fuller Automobile Company has succeeded J. M. Quinby & Company as representative of the Simplex car for Philadelphia, eastern Pennsylvania and southern New Jersey.

HAMILTON, O.—The Y. M. C. A. Technical Institute has started a 10-weeks' course in automobile engineering at the factory of the Republic Motor Car Company. W. L. Barth, of the company, is the instructor.

SCRANTON, PA.—The Scranton Taxicab Company and the Scranton Transfer Company have combined under the name of the Scranton Taxicab Company. The offices of the company will be in the Lackawanna passenger depot building.

WHEELING, W. VA.—This city is to have another new industry owing to the recently patented invention of G. W. Steenrod. The invention is a dual ignition system using one distributer and securing two simultaneous sparks for each cylinder.

COLUMBUS, O.—The Broadway Motor Car Company, 842-844 West Broad street, will handle the Paige-Detroit car in this county and will conduct a general garage and repair business. The concern occupies a new building erected for its use.

LOS ANGELES, CAL.—The automobile record from Los Angeles to Santa Barbara has again been clipped, this time by 14 minutes. A Cadillac driven by T. J. Beaudet dashed down the coast in the remarkably fast time of 2 hours and 42 minutes.

GRAND RAPIDS, MICH.—The Buick Auto Sales Company has elected the following officers: president, Julius LaBoutel; vice-president, Frank S. Elston; secretary, Wilbur Lawrence; treasurer, William Martineau; general manager, Fred S. Hughes.

FLINT, MICH.—After a trip of more than 1,500 miles in their private car the Texas representatives of the Buick Motor Company recently made an inspection of the company's Flint plant and also inspected the factories of the Imperial Wheel Company, the Durant-Dort Carriage Company, the Weston-Mott Company and others.

PORTLAND, MICH.—Sylvester Jenkins and Roger Smith have been granted letters patent on a spark-plug to be used in gasoline engines, including automobile engines. The device makes it possible to look through a glass on the side and see how the plug is firing. When the glass-covered opening is not being used it may be closed by means of a lever, the glass thus being protected from the soot.

GRAND RAPIDS, MICH.—The Grand Rapids Automobile Club will have a new $20,000 clubhouse by next summer on a tract of land near Plainfield, ten miles north of here. The committee in charge of the matter, comprising Charles Phelps, Alvah Brown and Dr. F. C. Warnshuis, already have selected the exact site for the building, which will overlook Grand River at one of its prettiest stretches.

SACRAMENTO, CAL.—J. O. Lauppe will hereafter handle the Jackson line of cars in this territory.

DETROIT, MICH.—The Abbott Motor Company, of this city, has increased its capital to $1,500,000.

INDIANAPOLIS, IND.—The Dayton Airless tire agency for southern Indiana has been secured by J. L. Dulin.

DENVER, COL.—The Overland Auto Company, of this city, has placed branches at Albuquerque, N. Mex., and at Phoenix, Ariz.

WORCESTER, MASS.—The Acme Motor Car Company, of this city, representing the Velie in this territory, has established a service station.

PORTLAND, ORE.—Cox & Sorenson, of 719 Chamber of Commerce building, have secured the general agency for the Dayton Airless tire for Oregon.

PORTLAND, ORE.—C. B. Caldwell has joined the force of the White Motor Car Company. He was formerly with the sales department of Chancelor & Lyons.

KANSAS CITY, MO.—The Bond Motor Car Company has broken ground for a modern three-story garage and salesroom. The concern represents the Franklin car.

LOS ANGELES, CAL.—The Motor Service Company, Inc., has opened its new garage. William Bailey, proprietor of the Bailey ranch, is the president of the new company.

OLYMPIA, WASH.—The Motor Supply & Investment Company has taken the agency for the Hudson line. M. E. Johnson will handle the Hudson cars in Centralia, Wash.

SANTA ROSA, CAL.—Luther Burbank announced recently that he has discovered a process whereby he could use the leaves of cactus plant in manufacturing automobile tires.

MASON CITY, IA.—D. W. Henry, formerly sales manager of the Inter-State Automobile Company, of Muncie, Ind., has taken a position with the Colby Motor Company.

NEW YORK CITY.—The Kerosene Gas Producer Company has opened its sales office at 1926 Broadway. The company is the agent of the Universal Oil Converter Company.

VANCOUVER, B. C.—The Central Auto & Supply Company, Franklin, dealer in this territory, has begun the rebuilding of its establishment, which was destroyed by fire some months ago.

TOPEKA, KAN.—The general agency for the Dayton Airless tire for the State of Kansas has been taken by E. Linge, 123 West Fifth street, where he has opened an office and showroom.

NEW YORK CITY.—The Abbott-Detroit car has a down-town showroom located in the concourse of the Hudson Terminal building through which many thousands of persons pass every day.

LOS ANGELES, CAL.—W. Wurzburger, formerly connected with the Pioneer Commercial Auto Company, of this city, has taken a position of sales manager with the Moreland Motor Truck Company.

WASHINGTON, D. C.—The Meridian Sales Company, 729 Fifteenth street, Washington, D. C., has secured the agency of the Dayton Airless tire for Maryland, Virginia and the District of Columbia.

LOS ANGELES, CAL.—A new company has entered the local tire field at 311 West Pico street, namely the Shawmut Rubber Company. The branch will be in charge of J. Clark Smith, J. Warren Smith and S. H. Ellis, Jr.

SEATTLE, WASH.—L. P. Hornberger has taken the general management of the Pacific Coast territory for the Dayton Airless tire and will establish offices in the principal cities. His office temporarily is in the Alaska building.

WORCESTER, MASS.—Harry G. Stoddard has become associated with the Wyman & Gordon Company in the capacity of vice-president and general sales manager. Mr. Stoddard was formerly president of the Trenton Iron Company, of Trenton, N. J.

WHITTIER, CAL.—A Ford agency has been added to the roster of automobile business houses here. McKenzie & Bellows, of Long Beach, having opened an agency at Starbuck & Caldwell's garage. F. L. Darling is the local representative for Whittier and surrounding territory.

CHICAGO, ILL.—Charles P. Jaeger, who was formerly connected with the Thomas Motor Car agency in Chicago, has acquired the general selling agency for Dayton Airless tires for northern Illinois, northern Indiana and southern Wisconsin, and has opened showrooms and offices at 2123 Michigan avenue.

LOS ANGELES, CAL.—Leon T. Shettler announces a slight change in his business. He has incorporated under the name of the Leon T. Shettler Company and taken in as a partner Captain G. W. Nevis, of Redlands, Cal. He will build a new salesroom and garage on Pico street, retaining his mechanical department on West Washington street.

BRONXVILLE, N. Y.—The Ward Leonard Company, of this city, has established agencies in the following cities: Rochester, N. Y.; Buffalo, N. Y.; Syracuse, N. Y.; Utica, N. Y.; Albany, N. Y.; Poughkeepsie, N. Y.; Hartford, Conn.; Cleveland, O.; Moline, Ill.; Chicago, Ill.; Philadelphia, Pa.; Grand Rapids, Mich.; Athens, Ga.; New Orleans, La.; Sioux City, Ia.; Tampa, Fla.; Portland, Me,; Marion, O.; Worcester, Mass., and Boston, Mass. The company manufactures automatic dynamo lighting systems for automobiles.

BOSTON, MASS.—The Thomas B. Jeffery Company, of Kenosha, Wis., has just concluded negotiations with a big Boston real estate firm for the erection in the Back Bay of what will be one of the most pretentious motor homes in the country. It will be located on Commonwealth avenue in the Fenway section, where the Peerless, Packard, Locomobile, Winton, Matheson, Lozier and Autocar homes are placed. It will be a four-story structure with 60,000 sq. ft. of floor space. The total cost of land and buildings will be approximately $250,000, and the Jeffery company has taken a lease of it for a number of years. It is expected that it will be ready for occupancy about June.

Showroom of the Abbott-Detroit and Regal cars in the Hudson Terminal

PASADENA, CAL.—Washburn Brothers have secured the agency for the Buick and Reo cars in this city and vicinity.

BALTIMORE, MD.—A local agency for the Fiat car has been established with F. C. Latrobe, Jr. He has his garage at 1010 Morton street.

BALTIMORE, MD.—J. S. Ditch has taken the local agency for the Detroit Electric, with headquarters at North and Mt. Royal avenues.

BALTIMORE, MD.—Walter Scott, representative for the Marmon and Crawford cars, has arranged to enlarge his showrooms at 1127 West North avenue.

CINCINNATI, O.—J. A. Vaughn has succeeded H. W. Farr as manager of the Cadillac Motor Sales Company. Mr. Farr has returned to his former home at Detroit.

BALTIMORE, MD.—O. G. Hoff has joined the local sales-force of the Stoddard-Dayton Auto Company of Baltimore. He was formerly automobile expert for the Standard Oil Company.

DES MOINES, IA.—The Means Auto Company has taken the Iowa distributing agency for the Marathon car. Clarence J. Rose has joined the company and will have charge of the branch business.

LINDSAY, CAL.—The Standard Motor Car Company, of San Francisco, has recently closed a contract with J. B. Enloe, of this city, to handle the Stoddard-Dayton. Mr. Enloe will open a fine garage here.

SYRACUSE, N. Y.—Herbert Hess, for the past fifteen months has been general manager of the Franklin Automobile Company, Syracuse, N. Y., has resigned to go into the real estate, loan and insurance business.

SYRACUSE, N. Y.—Charles E. Reynolds, of this city, has been made a district manager for the Chase Motor Truck Company. His territory covers Chicago and portions of the Middle West. He has established his headquarters in the Marquette building, Chicago, Ill.

CINCINNATI, O.—The Buckeye Sales Company has agreed to take the entire output of the Bac-2-light Company, of this city, amounting to not less than 15,600 Bac-2-lights for the present year. The light is the invention of R. Martin, of Dayton. It is a combination of tail-light and running-light.

FLINT, MICH.—Petitions from every township in Genesee county and from the city of Flint asking for the submission of a proposition to bond the county for $500,000 for good roads will be presented to the board of supervisors at its January session.

CINCINNATI, O.—The Leyman-Buick Company, heretofore handling the Grabowsky power wagon, made in Detroit, has taken the agency for the Mack truck, manufactured by the International Motor Company at Allentown, Pa., and for the Sauer truck now manufactured in Plainfield, N. J., by the same company.

NEW YORK CITY.—C. J. Cross, who was formerly general manager of the American-La France Fire Engine Company, of Elmira, N. Y., has recently made an arrangement with the Dayton Rubber Manufacturing Company, of Dayton, O., manufacturer of Dayton Airless tires, to be general sales agent for the entire East. Mr. Cross has established headquarters, showrooms and offices at 1878 Broadway.

CHICAGO, ILL.—D. P. Choate, formerly connected with the Chicago House Wrecking Company as general merchandise manager, has been appointed manager of the Chicago Kisselkar branch, which has had its territory enlarged to take in Illinois, Indiana, Iowa and Ohio. Harry P. Branstetter, former manager, will remain with the branch.

NEW YORK CITY.—The sales offices of the Eisemann Magneto Company have been moved from the Ford building in Detroit to 225-227 West Fifty-seventh street in this city. The Detroit offices will be continued as branch offices, with H. D. Wilson in charge. The company has also opened a branch in Indianapolis, Ind., in charge of Lon R. Smith. A. T. LeBlanc has been made sales manager of the company.

Automobile Incorporations

AUTOMOBILES AND PARTS

MILWAUKEE, WIS.—Pauly, Bruce, Goldacker Company; capital $25,000; to deal in automobiles. Incorporators: L. C. Pauly, Jr., J. G. Bruce, E. F. Goldacker, E. L. Bahler, C. F. Lauson.

DETROIT, MICH.—Hunter Auto Lock Company; capital $10,000; to manufacture automobile accessories. Incorporators: G. E. Eckert, J. McHugh, M. E. Griffith.

AUGUSTA, GA.—Union Motor Sales Company; capital $200,000; to manufacture and deal in automobiles. Incorporator: E. M. Leavitt.

RAHWAY, N. J.—Acme Body Company; capital $100,000; to manufacture automobile, carriage and wagon bodies. Incorporators: H. A. Grubem, F. Gallagher, G. L. Freeman and others.

WILMINGTON, DEL.—Tri-Mount Auto Truck Company; capital $100,000; to manufacture and sell motors, engines and machinery.

PLAINFIELD, N. J.—O. A. R. Motor Company; capital $60,000. Incorporators: O. A. Reed.

TOLEDO, O.—Auto Specialty Company; capital $10,000; to manufacture automobile parts and accessories. Incorporators: C. S. Northup, L. M. Morgan, L. Letcher, E. Peters, C. H. Masters.

CLEVELAND, O.—E. A. Hammer Company; capital $15,000; to manufacture, buy, sell and deal in automobiles, motor boats and automobile supplies. Incorporators: J. Bushea, J. Miller, C. Murman, W. J. Mahon, E. A. Hammer.

ROCHESTER, N. Y.—Cutting Auto Sales Company; capital $15,000; to deal in automobiles. Incorporators: L. F. Wilcox, A. M. Wilcox, J. W. Wood.

SPRINGFIELD, ORE.—Springfield Auto Truck Company; to manufacture automobile trucks. Incorporator: W. Stevens.

RACINE, WIS.—Mitchell Motor Company, of Dallas; capital $5,000; to construct an automobile agency at Dallas, Tex. Incorporators: J. W. Gilson, C. A. Armstrong, G. V. Rogers.

ST. LOUIS, MO.—American Motor Sales Company; capital $5,000; to manufacture, buy, sell and deal in automobiles. Incorporators: C. T. Strauss, F. B. Nulsen, C. W. Wanghop.

SWAMPSCOTT, MASS.—E. L. Brown Automobile Company; capital $25,000; to deal in automobiles Incorporators: E. L. Brown, M. H. Randall. J. D. Bee.

LYNN, MASS.—Automobile Omnibus Company; capital $10,000; to operate an automobile omnibus system. Incorporators: E. B. Phillips, P. B Therbault, J. J. Liffin.

NEWARK, N. J.—Nuse Wagon & Automobile Company; capital $50,000; to manufacture automobiles. Incorporators: G. W. Nuse, F. Nuse, Sr., F. Nuse, Jr., L. Nuse.

COVINGTON, KY.—Kentucky Motor Car Company; capital $20,000; to deal in automobiles. Incorporators: P. L. Bethell, W. R. Allen.

ROCK ISLAND, ILL.—Horst & Streiter Company; capital $10,000; to conduct a motor vehicle business. Incorporators: H. W. Horst, M. T. Horst M. E. Streiter.

GARAGES AND ACCESSORIES

ST. LOUIS, MO.—American Automobile Insurance Company; capital $200.000; to insure automobiles, etc. Incorporators: C. W. Disbrow, L. B. Pierce.

GREENSBORO, N. C.—Ford Garage & Sales Company; capital, $10,000; to operate a garage and sales agency. Incorporators: R. L. Markham, W. H. McGlamery, W. M. Combs.

COLUMBUS, O.— Star Vulcanizer Manufacturing Company; capital $5,000; to manufacture vulcanizers and other automobile sundries. Incorporators: D. F. Detrick, W. L. Cox, N. J. Fountain, E. Cox, A. Fountain.

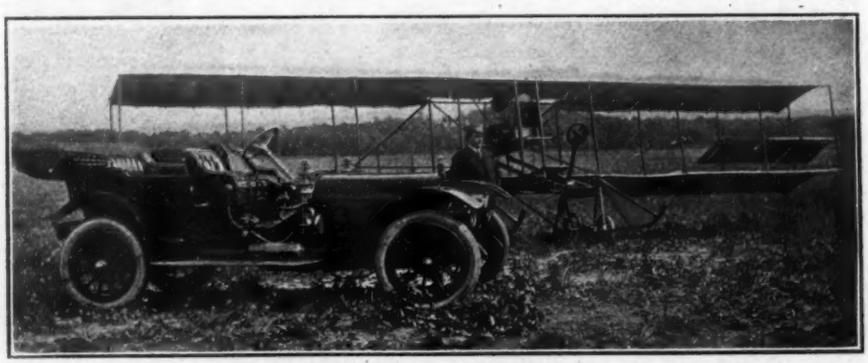
CLEVELAND, O.—O'Neil Tire Protector Sales Company; capital $10,000; to deal in automobile tires, tire protectors and other supplies. Incorporators: F. Butler, M. K. Klinger, M. L. Bernstein, B. J. Sawyer, A. J. Halle.

C.515.(&4, O.—Hammer & Hull Company; capital $10,000; to manufacture, repair and deal in automobile supplies. Incorporators: J. Bushea. I. Miller, C. Murman, W. J. Mahon, E. A. Hammer.

KANSAS CITY, MO.—Automobile Combination Lock & Circuit Breaker Company; capital $25,000; to manufacture automobile accessories. Incorporators: S. Baker, S. R. Hill, J. W. Nowlin and others.

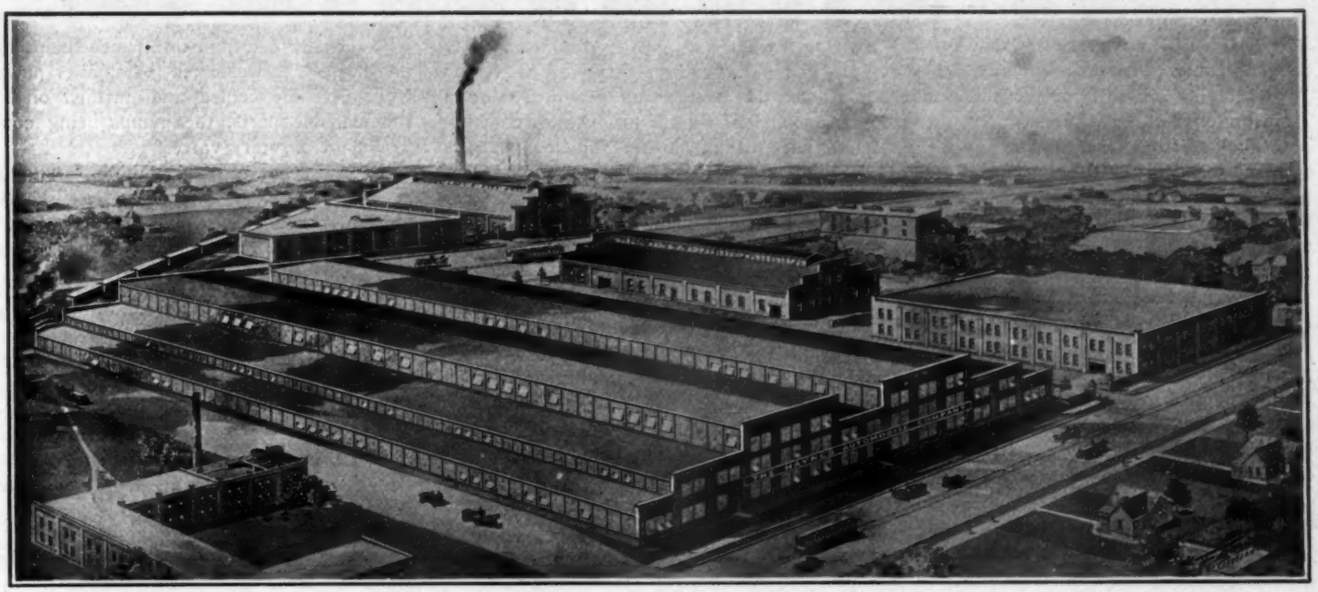
BOSTON, MASS.—Automobile Horn & Pump Company; capital $25,000; to manufacture and deal in automobile accessories. Incorporators: J. Payne, A. J. Son, A. Dubrawski.

DAVENPORT, IA.—B. & B. Auto Company; capital $10,000; to buy and sell automobiles. Incorporators: B. C. Brown, H. S. Burnap.



Edmund K. Fox, of Washington, D. C., with his aeroplane and Matheson Six

OF INTEREST to the INDUSTRY



Bird's-eye view of Haynes Automobile Company's plant at Kokomo, Ind.

KOKOMO, IND.—The new factory of the Haynes Automobile Company in this city covers an area of 7 1-2 acres of ground. The six buildings are composed of concrete, steel and brick and are fireproof. They have 400,000 square feet of floor space.

GIBSONBURG, O.—The Lauth-Juergens Motor Truck Company is planning to establish a branch factory in this city.

DETROIT, MICH.—The Federal Motor Truck Company is looking for another factory on account of the increase of business.

ATLANTA, GA.—The Nyberg Automobile Company, of Chicago, Ill., with a branch factory at Anderson, Ill., will soon establish a branch factory in this city.

MARINE CITY, MICH.—The Automobile Manufacturing & Engineering Company, of this city, is building an addition to its factory. The new structure will measure 50 by 80 feet.

AKRON, O.—A permit has been granted to the Diamond Rubber Company for a new tire storeroom to be 61 by 71 feet and two stories high. It will be constructed of tile and cement and will cost about $5,000.

CAMBRIDGE, MASS.—The Berkshire Automobile Company, of Pittsfield, Mass., has decided to move to this city, a temporary factory having been secured near the Shoe & Leather Building here. Later on a new building will be erected.

NEW YORK CITY—Alden L. McMurtry has resumed the manufacture of the McMurtry mechanical horn. Mr. McMurtry is the original inventor of mechanical diaphragm signal apparatus and his new horn is the result of nine years' experimental work.

NEW YORK CITY—Phineas Jones & Company, of Newark, N. J., have opened a branch factory at Twelfth avenue and Fifty-fifth street in this city. The company manufactures wood automobile wheels. The new branch factory will be operated as a service department for the repair of wheels.

EAU CLAIRE, WIS.—M. W. Savage, head of the big Savage corporations at Minneapolis and Savage, Minn., has contracted with the Northwestern Steel & Iron Company, of this city, for a minimum of $50,000 worth of gasoline motors and engines for 1912. The engines are of all sizes, types and horsepower.

SYRACUSE, N. Y.—The Chase Motor Truck Company, which has just moved into a new three-story addition to the present plant in Wyoming street, is planning the erection of another addition. The new building increased the working space of the plant about 18,000 square feet, but there is need of still more room.

MOLINE, ILL.—The Root & Van Dervoort Engineering Company and the Moline Automobile Company have contracted with the Western Union Telegraph Company for installation of A. D. T. night watch and fire alarm service in their factories at East Moline. Thirty-six boxes have been ordered and will be installed February 1.

ST. LOUIS, MO.—The Matthews-Davis Tool Company, of this city, manufacturer of expansion boring tools and reamers, has completed its large new plant at 3722 Forest Park boulevard. An extensive equipment of modern machinery has been installed. The new plant has three times the capacity of the old one.

MOLINE, ILL.—Frank Woods, general executive of the Chicago Motor Club, has been appointed temporary superintendent of the East Moline plant of the Midland Motor Company to fill the vacancy recently caused by the resignation of Henry P. Pope, superintendent of the plant for the last three years and son of C. H. Pope, former president of the Midland company.

AKRON, O.—The organization of the Auto Appliance Manufacturing Company of this city, incorporated recently with a capital of $50,000, was completed by the election of the following officers: J. W. Miller, president; J. A. Swinehart, vice-president; A. Auble, Jr., secretary and treasurer and general manager; C. W. Steele, superintendent and C. C. Welker, sales manager. The company will manufacture starting devices for automobile engines and a number of other accessories.

WASHINGTON, D. C.—Under section 25 of the tariff act, the Treasury Department has made a ruling allowing drawback on inner tubes for automobile tires manufactured by the Michelin Tire Company, of Milltown, N. J., with the use of imported metric thread valves. It is provided that the allowance of drawback shall not exceed one imported valve for each inner tube exported. The manufacturer's sworn statement, together with a sample of a section of an inner tube with the imported valve attached, has been filed with the collector of customs at New York.

PATENTS GONE TO ISSUE

SAFETY-STARTER FOR INTERNAL COMBUSTION ENGINES—In which a ratchet is used to protect the cranker from the effects of backfires.

1. The starting mechanism (Fig. 1) referred to in this patent consists of a supplemental shaft mounted in axial line with the crankshaft of the engine and movable toward and from the same and adapted to engage it. Normally a spring holds the supplemental shaft out of engagement with the crankshaft; the former has a crank arm mounted on its outer end, which is provided with an internal chamber. Within the chamber a gear is mounted on the shaft to which it is keyed, and a handle spindle is mounted in the outer end of the crank arm. On the spindle and within the crank arm a gear is mounted and keyed to the spindle, and intermediate gears in the arm and meshing with the first-mentioned gears and with each other. A ratchet wheel is secured to the inner side of the crank arm where the supplemental shaft passes through it and a number of suitably supported pawls are so disposed as to engage the ratchet.

No. 1,013,293—to Anthony P. Hinsky, Brooklyn, N. Y. Granted January 2, 1912; filed May 2, 1911.

CASE-HARDENING APPARATUS—A furnace for carbonaceous cementation of soft-iron materials.

5. This patent relates to the combination of a closed oven (Fig. 2) having thickened, heat-retaining walls, with a series of burners for mixed air and fuel opening into the oven at its base. Between the burners and the oven body there is a thick heat-retaining bed slab, flame passages being left between the bed edges and the oven walls. Means are provided for supplying carburizing gas to the oven after the flames have been extinguished at the burners, the oven being provided with a capacious vent for the products of combustion and with a closure for this vent, as well as with a regulatable constricted vent for the carburizing gas.

No. 1,013,191—to Adolph W. Machlet, Elizabeth, N. J. Granted January 2, 1912; filed May 25, 1906.

CONTROLLING DEVICE FOR INTERNAL COMBUSTION ENGINE.—Mechanism for regulating the ignition in the engine cylinders.

2. This construction (Fig. 3) comprises a reversible valve gear and a mechanical timer in the circuit, which is provided with an insulated stationary contact. The latter has a forward step, a reverse step and an intermediate regulating step. A forward insulated contact is provided and a movable contact member intermittently connects the forward step and insulated contact; a reverse insulated stationary contact is intermittently connected by a reverse movable member to the second insulated contact; and a regular movable member is adapted to intermittently close the circuit through the regular step in synchronism with the operation of the valve gear. A starting switch is adapted to ground either the forward or reverse stationary insulated contact on the engine.

No. 1,013,245—to George H. Watt, assignor to the Watt Motor Company, Detroit, Mich. Granted January 2, 1912; filed May 15, 1908.

LUBRICATING SYSTEM.—A force-feed system comprising oil circulating and purifying mechanisms.

1. This invention comprises a combination of a pump for drawing off waste oil with a cooler and filter into which the pump discharges the waste oil. A smaller pump transports the cooled and purified oil to the machine parts, the pumps being controlled by a rotary valve.

No. 1,013,644—to Paul Daimler, assignor to the Daimler Motoren Gesellschaft, Untertuerkheim, Germany. Granted, January 2, 1912; filed September 4, 1907.

VEHICLE BRAKE.—A system for stopping the car from the tonneau.

1. This patent covers the combination of an automobile with a wheel brake operated from the chauffeur's seat only. A releasable handle is located in the tonneau and a wire is affixed to it, it having a round turn wound around the driving shaft of the motor and being connected with the wheel-brake. Guide pulleys for the wire are provided as well as means for breaking the engine ignition, these latter means to be operated from the passenger seats.

No. 1,013,473—to Harald Eduard Frederik Block, Copenhagen, Denmark. Granted January 2, 1912; filed February 27, 1911.

BALL BEARING CAGE-RING.—A retainer of the one-sided type, specially designed for bearings in motor cars.

This patent has reference to a one-sided cage-ring comprising a circular member having a number of ball-receiving cavities, between which fixed partitions are axially disposed. Outer and inner portions of the partitions have different elevations, the elevated portions overhanging the depressed ones and forming laterally undercut recesses.

No. 1,013,518—to August Schilling, assignor to Bielefelder Maschinenfabrik, Bielefeld, Germany. Granted January 2, 1912; filed August 1, 1911.

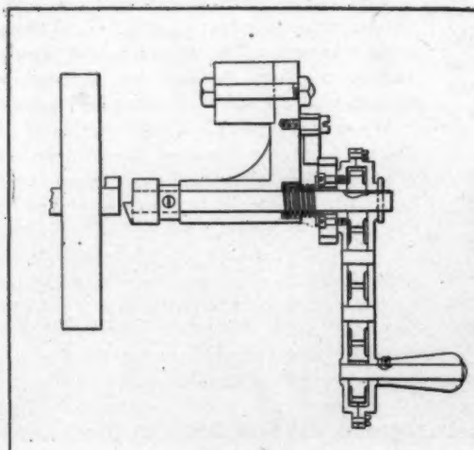


Fig. 1—Hinsky safety-starter

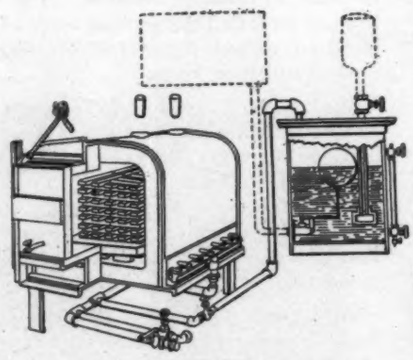


Fig. 2—Machlet case-hardening apparatus

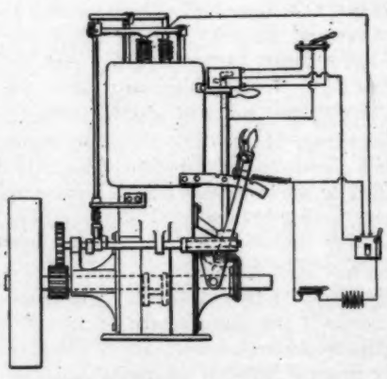


Fig. 3—Watt controlling device